Department of Food and Nutrition
Master of Science (M.Sc. Food and Nutrition)

GUJARAT VIDYAPITH: AHMEDABAD
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Department of Food and Nutrition

Course Structure For M.Sc. Food and Nutrition (2-years PG)
Effective from June 2025

Summary

Broad Category of Course	**Sem-1**	**Sem-2**	**Sem-3**	**Sem-4**	**Total**
Major (Core)	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05	20 (P)	
Major (Core)	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05		
Major (Core)	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05		
Major (Core)	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05	3 (T) +2 (P) = 05		
Total	20	20	20	20	80

SCHEME OF PAPERS

M.Sc. Semester-1

Sr. No	Broad Category of Course/ Course code	Subject Name	Hours		Credit	
			T	P	T	P
1	Major (Core) MFDN-101, MFDN-101-P	Human Nutrition	45	60	3	2
2	Major (Core) MFDN102, MFDN-102-P	Diet Therapy	45	60	3	2
3	Major (Core) MMFDN103, MFDN-103-P	Food Preservation and Microbiology	45	60	3	2
4	Major (Core) MFDN104, MFDN-104-P	Physiology	45	60	3	2
Total			**180**	**240**	**12**	**8**

T= Theory, P= Practicals

Available Total Credits= 20 Total required hours per semester=420
Total available hours per semester=517.5 hours
Available hours per week= 34.5 hours
Calculation of required hours per week
12 credits for theory=12 hours
8 credits for practicals=16 hours
Total required hours per week=28 hours
6.5 hours (tutorial class, remedial class, library class and other co-curricular activities during these hours).

SCHEME OF PAPERS

M.Sc. Semester-2

Sr. No	Broad Category of Course/ Course code	Subject Name	Hours		Credit	
			T	P	T	P
1	Major (Core) MFDN201, MFDN201-P	Public Health Nutrition	45	60	3	2
2	Major (Core) MFDN202, MFDN202-P	Dietetics and Diet Counselling	45	60	3	2
3	Major (Core) MFDN203, MFDN203-P	Nutritional Biochemistry	45	60	3	2
4	Major (Core) MFDN204, MFDN204-P	Entrepreneurship Management	45	60	3	2
Total			**180**	**240**	**12**	**8**

T= Theory, P= Practicals

Available Total Credits= 20 Total required hours per semester=420
Total available hours per semester=517.5 hours
Available hours per week= 34.5 hours
Calculation of required hours per week
12 credits for theory=12 hours
8 credits for practicals=16 hours
Total required hours per week=28 hours
6.5 hours (tutorial class, remedial class, library class and other co-curricular activities during these hours).

SCHEME OF PAPERS

M.Sc. Semester-3

Sr. No	Broad Category of Course/ Course code	Subject Name	Hours		Credit	
			T	P	T	P
1	Major (Core) MFDN301, MFDN301-P	Food Science	45	60	3	2
2	Major (Core) MFDN302, MFDN302-P	Maternal and Child Nutrition	45	60	3	2
3	Major (Core) MFDN303, MFDN303-P	Food Production & Management	45	60	3	2
4	Major (Core) MFDN304, MFDN304-P	Morden Cookery	45	60	3	2
Total			**180**	**240**	**12**	**8**

T= Theory, P= Practicals

Available Total Credits= 20 Total required hours per semester=420
Total available hours per semester=517.5 hours
Available hours per week= 34.5 hours
Calculation of required hours per week
12 credits for theory=12 hours
8 credits for practicals=16 hours
Total required hours per week=28 hours
6.5 hours (tutorial class, remedial class, library class and other co-curricular activities during these hours).

SCHEME OF PAPERS

M.Sc. Semester-4

Sr. No	Broad Category of Course/ Course code	Subject Name	Hours		Credit	
			T	P	T	P
1	Major (Core) MFDN401-P	Food and Nutrition (Dissertation)	-	600	-	20
Total			**-**	**600**	**-**	**20**

T= Theory, P= Practicals

CO Attainment Matrix

Benchmark (Target attainment) is 60% for M.Sc. Program

Attainment Criteria	Level	Description
≥ 60% students scored ≥ Benchmark	Level 3	**High Attainment** – Most students achieved the expected outcome.
50–59% students scored ≥ Benchmark	Level 2	**Moderate Attainment** – Outcome partially achieved.
40–49% students scored ≥ Benchmark	Level 1	**Low Attainment** – Minimal outcome achieved.
< 40% students scored ≥ Benchmark	Level 0	**Not Attained** – Remedial action required

PROGRAMME OUTCOMES (POs) FOR MASTER OF SCIENCE (M.Sc.)

POs	Integrated Justification
PO1: Advanced Scientific Knowledge	The program develops a sophisticated understanding and integrated application of Nutrition **and allied sciences**. Students acquire core competencies to address complex problems in research and professional settings through advanced scientific concepts and interdisciplinary approaches.
PO2: Research & Problem-Solving Skills	Students are equipped to **independently conceptualize, analyze, and solve complex** problems of societal and global relevance. They gain critical knowledge that enables systematic research, formulation of hypotheses, and application of scientific reasoning.
PO3: Experimental & Analytical Proficiency	The curriculum emphasizes mastery in **designing and conducting scientific experiments using advanced tools and methodologies.** Students critically evaluate and interpret data to derive reliable, reproducible scientific conclusions.
PO4: Interdisciplinary Approach	Graduates are prepared to lead and collaborate in multidisciplinary teams, integrating insights from various scientific fields to develop practical applications in areas such as **healthcare, environment, and Dietetics, biotechnology**.
PO5: Environmental Consciousness & Sustainability	The program cultivates the ability to apply **microbiological and Food and Nutrition knowledge to global sustainability challenges**. Students are encouraged to propose evidence-based solutions that align with environmental ethics and sustainable development goals.
PO6: Ethics & Professional Values	Upholding the highest standards of scientific integrity and **Gandhian values**, students are trained in responsible research practices and ethical decision-making in both academic and industry settings.
PO7: Effective Scientific Communication	The program ensures graduates can clearly **articulate scientific findings to diverse audiences**. They **are trained to publish research, communicate** within multidisciplinary teams, and advocate for **science-based societal advancement**.
PO8: Modern Technological Applications	**Students independently master and apply advanced technological tools**, data analytics, and computational methods to execute complex research projects and remain proficient in modern scientific practices.
PO9: Teamwork & Leadership in Research	The curriculum **fosters leadership, professionalism**, and collaboration. Graduates contribute effectively to scientific teams, manage research projects, and uphold social responsibility in their professional roles.
PO10: Lifelong Learning & Adaptability	Graduates demonstrate **independent learning and actively seek new knowledge and technologies**. The program nurtures a mindset of continual professional development to stay at the forefront of scientific progress.
PO11: Project Management &	Students are encouraged to **apply scientific knowledge to manage research initiatives efficiently**. The program promotes entrepreneurial thinking for

Entrepreneurial Thinking	developing innovative, technology-driven solutions.
PO12: Social & Community Engagement	Emphasizing the interplay between science and society, the program instills values of service and community engagement. **Graduates advocate for science-driven change** and communicate complex ideas to non-specialist audiences to address societal challenges.

PROGRAMME SPECIFIC OUTCOMES (PSOs) FOR MASTER OF SCIENCE (M.Sc.-Food and Nutrition)

PSO Number	Program Specific Outcome	Justification
PSO1: Mastery in Food and Nutrition Techniques and Innovations	**Graduates will acquire proficiency in Equip students with advanced knowledge and skills in food science, nutrition principles, and emerging technologies. Foster innovation in food processing, product development, and dietary interventions to meet contemporary nutritional challenges and promote public health. Research.**	**Aligned POs: PO1, PO3, PO8 Justification: This PSO directly reflects the need for advanced scientific knowledge (PO1), experimental & analytical proficiency (PO3), and technological applications (PO8) in Food and Nutrition.**
PSO2: Application of Food and Nutrition to Health, Agriculture, and Industry	**Graduates will apply Apply interdisciplinary knowledge of food and nutrition to improve human health, enhance agricultural practices, and support innovation in food-related industries. Promote sustainable solutions for food security, clinical nutrition, and value-added product development. .**	**Aligned POs: PO2, PO4, PO5, PO11 Justification: This outcome addresses problem-solving (PO2), interdisciplinary approach (PO4), sustainability (PO5), and entrepreneurial thinking (PO11) through applied Food and Nutrition innovations.**
PSO3: Ethical Scientific Inquiry and Communication	**Graduates will demonstrate ethical reasoning in research, effective communication of Food and Nutritional findings, and community-oriented scientific outreach with a commitment to social responsibility.**	**Aligned POs: PO6, PO7, PO9, PO10, PO12 Justification: This aligns with ethics (PO6), scientific communication (PO7), teamwork and leadership (PO9), lifelong learning (PO10), and community engagement (PO12), preparing students as responsible and socially**

		aware Food and Nutritionist.

Semester-1

M.Sc. Semester-1	**MFDN -101**	**Human Nutrition**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)

After studying this course, the student will be able to

CO1: Relate major Nutritional events with concepts of human nutrition and nutrient functions in the body. State basics of Nutritional taxonomy and classification.

CO2: State the Identify nutritional requirements across different life stages

CO3: Describe Analyze the impact of nutrient deficiencies and excesses on health.

CO4: Examine nutrition principles to promote health and prevent disease.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	2	–	–	–	–	–	–	–	2	–	2	**2.25**	2	2	3	**2.33**
2	3	3	2	–	2	–	–	–	–	–	–	2	**2.4**	3	3	2	**2.67**
3	3	2	–	3	3	–	–	–	–	–	–	3	**2.8**	2	2	1	**1.67**
4	3	3	–	2	3	–	2	–	2	3	2	3	**2.5**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyse
CO4	Analyse, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates insightful understanding of Food and Nutritional and applies concepts independently and critically.
Good (3)	Shows strong understanding with correct application of concepts; few minor

	errors.
Average (2)	Basic understanding is evident but limited in application and clarity.
Poor (1)	Demonstrates minimal understanding and struggles with applying key concepts.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism 4. Problem Based Learning 5. Project Based Learning 6. Inquiry-Based Learning
Teaching Methods and Tools
1. Lecture 2. Digital and Multimedia Presentations, 3. Diagrams and Layouts, 4. Group discussion 5. Online Resources and Digital Content 6. Fairs and Competition 7. Experimentation, 8. Hands on training 9. Group Work and Collaborative Learning 10. Demonstrations 11. Tutorials

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Energy Metabolism & Carbohydrates	11
○ Energy: • Definition and Components of Energy Requirement • Factors Affecting Energy Expenditure and Requirement • Methods of Estimation of Energy Expenditure and Requirements • Current recommendations for energy intake of different age, sex groups • Disorders of energy metabolism: Obesity and under nutrition • Short term and long-term weight maintenance (Gut fill cues, Glucostat theory, Lipostat theory) ○ Carbohydrates • Digestion, absorption and utilization, • Functions and Classification of Carbohydrates • Regulation of Blood Glucose Concentration • Simple and Complex carbohydrates, Non-starch polysaccharides and fibre constituents and their role in Nutrition.	

• Glycaemic Index, Glycaemic load and Satiety index: Clinical implications • Disorders related to carbohydrate metabolism Modification of Carbohydrate Intake for Specific Disorder	
Unit 2 Proteins and Lipids	11
2.1 Proteins • Classification, Food Sources • Digestion, Absorption and Transport, Functions • Improvement of Quality of Protein in the Diet • Human requirements for proteins (RDA) • Methods of Estimating and Assessing protein Requirements at Different Stages • Life Cycle • Protein Deficiency 2.2 Lipids • Basic Facts • Types of Fats and its Metabolism (digestion, absorption, transport) • Functions of Fat and Oils • Assessment of Lipid status • Nutritional Requirements of Fats and Oils, Visible and invisible fats in diets • Excessive Fat Intake: Changing Trends in Dietary Intake Eating Out Diseases: Association and Preventive Measure	
Unit 3 Fat Soluble Vitamins – A, D, E, K & Water-Soluble Vitamins	11
• **Unit -3. Fat Soluble Vitamins (A, D, E, K) and Water-Soluble Vitamins** (Thiamine, Riboflavin Niacin, Pantothenic Acid, Pyridoxine, Biotin, Folacin, Cobalamin and Ascorbic acid) 3.1 Fat Soluble Vitamins – A, D, E, K • Basic Facts • Digestion, absorption, transport and metabolism • Food Sources of Vitamins • Bioavailability • Function • Assessment of vitamin status • Interaction with other nutrients • Toxicity and deficiency • RDA 3.2 Water Soluble Vitamins (Thiamine, Riboflavin Niacin, pantothenic Acid, Pyridoxine, Biotin, Folacin, Cobalamin and Ascorbic acid) • Basic Facts • Digestion, absorption, transport and metabolism	

• Food Sources of Vitamins • Bioavailability • Function • Assessment of vitamin status • Interaction with other nutrients • Toxicity and deficiency • RDA	
Unit-4 Minerals: Major or Macro elements (Calcium, Chlorine, Phosphorous, Potassium, Sulphur, Sodium and Magnesium) and Minor or Trace elements (Cobalt, Chromium, Copper, Iron, Fluorine, Iodine, Zinc)	12
• Sources • Digestion, absorption, transport, metabolism • Biochemical function • Deficiency and toxicity • RDA Interaction with other nutrient	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References

Standard Human Nutrition References

1. **Human Nutrition**
   - **Editors**: Catherine Geissler & Hilary Powers
   - **Latest Edition**: 13th Edition (2017)
   - **Publisher**: Oxford University Press
   - **Note**: A comprehensive global reference covering physiology, clinical nutrition, and public health.
2. **Modern Nutrition in Health and Disease**
   - **Editors**: A. Catherine Ross, Benjamin Caballero, Robert J. Cousins, Katherine L. Tucker, Thomas R. Ziegler
   - **Latest Edition**: 12th Edition (2020)
   - **Publisher**: Wolters Kluwer / Lippincott Williams & Wilkins
   - **Note**: Advanced reference text for clinical and academic research in nutrition.
3. **Introduction to Human Nutrition**
   - **Editor**: Susan A. Lanham-New et al.
   - **Latest Edition**: 3rd Edition (2020)
   - **Publisher**: Wiley-Blackwell
   - **Note**: Recommended by the Nutrition Society (UK); ideal for

undergraduate/postgraduate studies.

4. **Nutrition Science**
    - **Author**: B. Srilakshmi
    - **Latest Edition**: 8th Edition (2020)
    - **Publisher**: New Age International Publishers
    - **Note**: Widely used in Indian universities for its simple explanation and updated guidelines.
5. **Essentials of Human Nutrition**
    - **Editor**: Jim Mann & Stewart Truswell
    - **Latest Edition**: 5th Edition (2017)
    - **Publisher**: Oxford University Press

Scientific Guidelines & Official Publications

1. **Dietary Guidelines for Americans (2020–2025)**
    - Published by USDA and HHS
    - https://www.dietaryguidelines.gov
    - Offers evidence-based nutrition guidance for the U.S. population.
2. **World Health Organization (WHO) – Nutrition**
    - https://www.who.int/health-topics/nutrition
    - Global guidelines on nutrition across the life course.
3. **National Institutes of Health (NIH) Office of Dietary Supplements**
    - https://ods.od.nih.gov

Extensive information on vitamins, minerals, and dietary supplements.

Scientific Journals

- *The American Journal of Clinical Nutrition*
- *Nutrition Reviews*
- *Journal of Nutrition*
- *Public Health Nutrition*

Web & Other Study Resources

1. National & International Nutrition Portals

- **FAO Nutrition** – www.fao.org/nutrition
- **WHO Nutrition** – www.who.int/nutrition
- **NIH Office of Dietary Supplements** (USA) – ods.od.nih.gov
- **FSSAI Eat Right India** – www.fssai.gov.in/eatright

2.E-Books & Open Textbooks

- **OpenStax – Nutrition: Science and Everyday Application**

https://openstax.org/books/nutrition/pages/1-introduction
(Free college-level textbook)

- **Human Nutrition (University of Hawai'i at Mānoa)**
  https://pressbooks.oer.hawaii.edu/humannutrition/
  (Covers macronutrients, micronutrients, health conditions)
- **NCERT Class 11 & 12 Home Science** (for foundational knowledge)
  https://ncert.nic.in/ebooks.html

3.YouTube Channels

- **Nourishable** – Animated videos explaining human nutrition
- **Dr. Been Medical Lectures** – Human physiology, nutrition and biochemistry
- **Nutrition Made Simple** – Practical tips and academic insights

4. Research Databases & Journals

- **PubMed** – https://pubmed.ncbi.nlm.nih.gov/
  Search terms: *human nutrition*, *micronutrient deficiencies*, *nutritional epidemiology*
- **Journal of Human Nutrition and Dietetics** (Wiley)
- **Clinical Nutrition ESPEN**
- **Indian Journal of Nutrition and Dietetics**
  http://www.ijnd.in/

M.Sc. Semester-1	**MFDN -101P**	**Human Nutrition**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Distinguish Nutritional based on their physiological and nutrient deficiencies and excesses on health. CO2: Compare principles to promote health and prevent disease.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	2	2	–	–	3	2	–	–	2	**2.5**	3	2	2	**2.33**
2	3	3	3	2	–	2	3	2	2	3	2	3	**2.54**	2	3	2	**2.33**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Understand
CO2	Analyze, Evaluate, Create

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Performs practicals independently with precision and interprets results accurately.
Good (3)	Conducts experiments correctly with minor assistance; interprets data logically.
Average (2)	Performs basic steps but relies on help; interpretation may lack depth.
Poor (1)	Needs continuous supervision; results and interpretation are unclear or incorrect.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practical	
1	Plan, prepare Recipe with low and high glycemic index foods and calculate its nutritive value
2	**Plan**, prepare high Fiber and low Fiber Recipe and calculate its nutritive value
3	**Plan**, prepare low Fat Recipe and calculate its nutritive value
4	Plan, prepare high Protein Recipe and calculate its nutritive value

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-1	**MFDN-102**	**Diet Therapy**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Describe the principles of therapeutic diets and their modifications. **CO2:** Describe Plan and manage diets for various diseases and health conditions. **CO3:** State the Apply nutrition care process in clinical and hospital settings. **CO**4: Relate various role of diet in prevention and management of lifestyle disorders.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	2	–	2	–	–	–	–	2	–	–	**2.4**	3	2	2	**2.33**
2	3	2	3	–	–	–	–	3	–	–	–	2	**2.6**	3	2	3	**2.67**
3	3	2	–	2	2	–	–	–	–	–	–	–	**2.25**	2	3	2	**2.33**
4	3	3	2	–	3	–	2	3	–	3	2	2	**2.55**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels	
CO Code	**Cognitive Level**
CO1	Understand, Apply
CO2	Apply, Analyze
CO3	Understand, Analyze
CO4	Analyze, Evaluate

Assessment Rubric	
Level	**Performance Descriptor**
Excellent (4)	Demonstrates deep understanding of physiological concepts and their Nutritional relevance; applies independently.
Good (3)	Shows good understanding with minor errors in application.
Average (2)	Understands basics; application is incomplete or lacks detail.
Poor (1)	Minimal grasp of physiological concepts; little application evident.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit-1: Medical Nutrition Therapy	11

• Definitions and Role of Dietician in Health Care
  ○ Dietetics the Science and Art of Human Nutrition Care
  ○ Role of Dietician in Health Care
• The Nutrition Care Process (NCP)	

○ Nutrition Assessment ○ Nutritional Diagnosis ○ Nutrition Intervention ○ Nutrition Monitoring and Evaluation ○ Documentation • Importance of Coordinated Nutritional and Rehabilitation Services • Patient Care and Counselling ○ Patient Care Counselling	
Unit-2: Therapeutic Diets	11
○ Introduction ▪ Types of Dietary Adaptations for Therapeutic Needs ▪ Normal Nutrition: **A** Base of Therapeutic Diet ▪ Diet Prescription ▪ Constructing Therapeutic Diets ▪ Routine Hospital Diet ▪ Normal or General Diets ▪ Liquid Diets ▪ Soft Diets ○ **Mode of Feeding** ▪ Oral Feeding ▪ Tube or Enteral Feeding ▪ Peripheral Vein Feeding Total Parenteral Nutrition	
Unit-3: Nutritional Management in Fever and infection	12
• Defence Mechanism in the Body • Nutrition and Infection • Metabolic Changes during Infection ○ Classification and Etiology of Fever infection • Typhoid, Chronic Fever / Infection, Tuberculosis HIV (Human Immuno Deficiency Virus) Infection and AIDS (Acquired Immune Deficiency Syndrome	
Unit-4: Medical Nutritional Therapy in Critical Care	11
• Nutritional management of Critically Ill • Special feeding method in nutritional Support • **Enteral Nutrition**(EN) benefits advantages of EN Indications for enteric tube feeding for adults and children, Enteral feeds and their specific characteristics • **Parenteral Nutrition** Daily intravenous nutritional requirements in infants and children, PN products available in Indian market Transitioning to Oral Feeding • Nutrition care in immune deficiency diseases • Care during Cancers	

• Adverse Food Reactions • Food Allergy (Hypersensitivity) • Food Intolerance • Adverse Food Reactions-The Diagnosis Process • Treatment and Management of Adverse Food Reactions Prevention of Adverse Food Reactions	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Standard Diet Therapy References

1. **Krause's Food & the Nutrition Care Process**
   - **Authors**: L. Kathleen Mahan, Janice L. Raymond
   - **Latest Edition**: 15th Edition (2020)
   - **Publisher**: Elsevier
   - **Note**: Most widely used textbook for clinical nutrition, MNT (Medical Nutrition Therapy), and diet planning.
2. **Nutrition and Diet Therapy**
   - **Authors**: Linda Kelly DeBruyne, Kathryn Pinna
   - **Latest Edition**: 12th Edition (2022)
   - **Publisher**: Cengage Learning
   - **Note**: Great for dietetics students; covers the clinical applications of nutrition science.
3. **Dietetics: A Practical Approach**
   - **Author**: B. Srilakshmi

- **Latest Edition**: 8th Edition (2021)
- **Publisher**: New Age International Publishers
- **Note**: Popular in Indian universities; includes therapeutic diets, disease conditions, and Indian food patterns.

4. **Clinical Dietetics and Nutrition**
   - **Author**: F. P. Antia & Philip Abraham
   - **Latest Edition**: 4th Edition (2012)
   - **Publisher**: Oxford University Press
   - **Note**: Indian context-based clinical nutrition reference, widely cited in postgraduate studies.
5. **Manual of Dietetic Practice**
   - **Editor**: Joan Gandy (British Dietetic Association)
   - **Latest Edition**: 6th Edition (2019)
   - **Publisher**: Wiley-Blackwell
   - **Note**: Internationally recognized; excellent for dietetic internship and clinical application.

Official and Practice Guidelines

- **Academy of Nutrition and Dietetics (USA)**
  https://www.eatrightpro.org
  Practice guidelines and Evidence Analysis Library.

National Institute for Health and Care Excellence (NICE, UK)
https://www.nice.org.uk
Evidence-based guidelines for nutrition and chronic

Official and Practice Guidelines

- **Academy of Nutrition and Dietetics (USA)**
  https://www.eatrightpro.org
  Practice guidelines and Evidence Analysis Library.
- **National Institute for Health and Care Excellence (NICE, UK)**
  https://www.nice.org.uk
  Evidence-based guidelines for nutrition and chronic diseases.

Web & Other Study Resources

1. Standard Nutrition & Medical Platforms

- **Academy of Nutrition and Dietetics (USA)**
  https://www.eatright.org/
  (Great for guidelines, case studies, and therapy models)

- **National Institute of Nutrition (India)**
  https://www.nin.res.in/

(Indian RDA, disease-specific dietary guidelines)

- **Mayo Clinic Diet Therapy Pages**
  https://www.mayoclinic.org/
  (Reliable medical nutrition therapy information)

2. **Diet Therapy Books (Open Access)**

- **Diet Therapy by Sue Rodwell Williams**
  Often available on academic platforms or libraries (search PDF on NCBI/Google Scholar)
- **Nutrition Therapy and Pathophysiology**
  Author: Lutz & Przytulski (Check Google Books or library access)
- **Open Textbook: Nutrition and Disease**
  https://pressbooks.bccampus.ca/nutritionanddisease/
  (Good for diet therapy basics by disease condition)
- **Human Nutrition (Chapter: Diet Therapy)**
  https://pressbooks.oer.hawaii.edu/humannutrition/

3. **Key Journals for Case Studies & Research**

- **Journal of the Academy of Nutrition and Dietetics**
- **Clinical Nutrition (Elsevier)**
- **International Journal of Food and Nutritional Sciences (IJFANS)**
- **Indian Journal of Dietetics**
  http://www.ijnd.in/

M.Sc. Semester-1	**MFDN -102P**	Diet Therapy	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course the student will be able to
CO1: Use practical skills for measuring. **CO2:** Examine how environmental and nutritional factors influence through hands-on Preparation.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**

1	3	3	3	–	2	–	2	–	–	2	–	–	**2.5**	3	2	2	**2.33**
2	3	2	3	–	–	2	2	3	2	3	2	3	**2.77**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Apply, Understand
CO2	Analyze, Evaluate, Create

Assessment Rubric

Level	**Performance Descriptor**
Excellent (4)	Conducts procedures accurately; interprets physiological responses with clarity.
Good (3)	Executes most steps well with some help; interprets reasonably well.
Average (2)	Needs assistance in performing tasks; some gaps in interpretation.
Poor (1)	Requires supervision for all tasks; poor execution and unclear interpretation.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	**Market** survey of commercial nutritional supplements and nutritional support substrates
2	**Planning** and preparation of diets for patients
3	**3** Liquid diet; Soft diet; Tube or Enteral Feeding
4	Nutritional Management in Fever and infection

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-1	**MFDN -103**	**Food Preservation and Microbiology**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: State principles of food preservation methods and their applications. **CO**2: Describe various types of microorganisms affecting food quality and safety. **CO**3: Relate the principles and Apply preservation techniques to enhance shelf life and reduce spoilage. **CO**4: Examine role of microbes in food fermentation and contamination.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	Average	1	2	3	Average
1	3	3	3	-	-	2	2	-	-	-	-	-	**2.6**	3	2	2	**2.33**
2	3	3	3	-	-	-	2	3	-	-	-	-	**2.8**	3	2	2	**2.33**
3	3	2	3	-	-	-	-	2	-	-	-	-	**2.5**	3	3	2	**2.67**
4	3	3	3	-	-	-	2	3	2	3	-	-	**2.7**	3	2	2	**2.33**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Apply
CO2	Apply, Analyze
CO3	Analyze, Evaluate
CO4	Evaluate, Create

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates complete mastery of bioinstrumentation concepts and applications.
Good (3)	Shows strong understanding with minor conceptual or technical errors.
Average (2)	Understands basic principles but struggles with integration or application.
Poor (1)	Minimal understanding of instrumentation principles and their biological uses.

Teaching Pedagogy

1. Constructivism
2. Social Constructivism
3. Behaviorism

Teaching Methods and Tools

1. Direct Teaching using Black board,
2. Presentations,
3. Multimedia resources,
4. Diagrams and Layouts,
5. Group discussion and activity,
6. Experimentation,
7. Hands on training

Unit Wise Detailed Syllabus

Units	Number of Teaching

	Hours
Unit -1 Need for Food Preservation	11
Food Preservation Food Spoilage Food Infection Classification of microorganisms	
Unit 2 Role and Significance of Microorganisms in Foods	12
Bacteria Yeast Mold	
Unit 3 Methods of Isolation, Detection and Destruction of Microorganism.	11
Newer and Rapid Methods of Isolation and Detection of Microorganisms in Foods Conventional methods Rapid methods (newer techniques Microbiological criteria for various food products Principals Involved in Destruction of Microorganisms for Prolonged Storage of Foods Physical methods: drying, freezing, cell storage, heat treatment, irradiation, high pressure processing. Chemical preservation and natural antimicrobial compounds. Importance of Prebiotics and Probiotics in human health	
Unit-4 Immunity	11
Definition of antigen and antibody Types of immunity –Active and Passive Three stages of immunity – primary, secondary and tertiary Auto immune disease – Rheumatoid arthritis, Type 1 Diabetes, Psoriasis Immune body formation	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Food Preservation and Microbiology References

Food Microbiology

1. **Food Microbiology**
   - **Authors**: W.C. Frazier & D.C. Westhoff
   - **Latest Edition**: 5th Edition (2013)
   - **Publisher**: McGraw-Hill Education
   - **Note**: Classic reference for microbiological principles in food safety and spoilage.
2. **Modern Food Microbiology**
   - **Author**: James M. Jay, Martin J. Loessner, David A. Golden
   - **Latest Edition**: 8th Edition (2005)
   - **Publisher**: Springer
   - **Note**: Comprehensive reference for food pathogens, spoilage organisms, and control methods.
3. **Food Microbiology: Fundamentals and Frontiers**
   - **Editors**: Michael P. Doyle & Robert L. Buchanan
   - **Latest Edition**: 5th Edition (2019)
   - **Publisher**: ASM Press
   - **Note**: Suitable for advanced study; includes molecular and microbial food safety applications.

Food Preservation

4. **Principles of Food Preservation**
   - **Authors**: Norman N. Potter & Joseph H. Hotchkiss
   - **Latest Edition**: 5th Edition (1998; Reprinted editions available)
   - **Publisher**: Springer / CBS Publishers (India edition)
   - **Note**: Classic textbook for both undergraduate and postgraduate courses.
5. **Handbook of Food Preservation**
   - **Editor**: M. Shafiur Rahman
   - **Latest Edition**: 2nd Edition (2007)
   - **Publisher**: CRC Press (Taylor & Francis Group)
   - **Note**: Advanced level reference for preservation techniques, additives, and processing technologies.
6. **Food Science**
   - **Author**: B. Srilakshmi
   - **Latest Edition**: 7th Edition (2020)
   - **Publisher**: New Age International Publishers

Guidelines and Indian References

7. ICMR / FSSAI Guidelines

- Food hygiene and preservation standards for India
- https://www.fssai.gov.in
- Includes microbiological standards for food products, shelf life, safety, and

labeling.

8. Manual of Methods of Analysis of Foods (Microbiological Testing)

- **Publisher:** FSSAI
- Downloadable from the FSSAI website

Journals for Research & Case Studies

- *International Journal of Food Microbiology*
- *Food Control*
- *LWT – Food Science and Technology*
- *Journal of Food Protection*

Web & Other Study Resources

1. 1. **Lumen Learning.** *Food Preservation*.
   Available at: https://courses.lumenlearning.com/suny-mcc-microbiology/chapter/food-preservation/
   (Accessed 2025)
2. **Encyclopedia Britannica.** *Food Microbiology*.
   Available at: https://www.britannica.com/science/microbiology/Food-microbiology
   (Accessed 2025)
3. **Wikipedia.** *Food Irradiation*.
   Available at: https://en.wikipedia.org/wiki/Food_irradiation
   (Accessed 2025)
4. **MDPI.** Paparella, A., et al. (2025). *Microbial and Viral Approaches to Food Preservation*. *Pathogens*, 14(5), 492.
   https://www.mdpi.com/2076-0817/14/5/492
5. **NCBI PMC.** *Microencapsulation Technologies for Food Preservation*.
   Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC10348988/
   (Accessed 2025)
6. **Wikipedia.** *Hurdle Technology*.
   Available at: https://en.wikipedia.org/wiki/Hurdle_technology
   (Accessed 2025)

1. 2. **Lumen Learning — Food Preservation**
   https://courses.lumenlearning.com/suny-mcc-microbiology/chapter/food-preservation/
2. **Encyclopedia Britannica — Food Microbiology**

https://www.britannica.com/science/microbiology/Food-microbiology
3. **Wikipedia — Food Irradiation**
https://en.wikipedia.org/wiki/Food_irradiation
4. **MDPI — Microbial and Viral Approaches to Food Preservation (Research Article)**
https://www.mdpi.com/2076-0817/14/5/492
5. **NCBI PMC — Microencapsulation Technologies for Food Preservation**
https://pmc.ncbi.nlm.nih.gov/articles/PMC10348988/
6. **Wikipedia — Hurdle Technology**
https://en.wikipedia.org/wiki/Hurdle_technology

M.Sc. Semester-1	**MFDN -103P**	**Food Preservation and Microbiology**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Quantify Relate the principles and Apply preservation techniques to enhance shelf life and reduce spoilage. **CO**2: Explain hands-on experience with advanced of microbes in food fermentation and contamination.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	-	-	2	2	-	-	-	-	-	**2.6**	3	2	2	**2.33**

2	3	2	3	-	-	-	2	3	2	3	-	-	**2.57**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Apply, Understand
CO2	Analyze, Evaluate, Create

Assessment Rubric

Level	**Performance Descriptor**
Excellent (4)	Executes lab techniques independently and with precision; interprets results accurately.
Good (3)	Performs experiments well with minor guidance; interprets results logically.
Average (2)	Performs basic steps but needs assistance; results may be partially accurate.
Poor (1)	Needs significant help; data and interpretations are mostly incorrect.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Instruments used in microbiology laboratory – Bio Safety Cabinet, Incubator, Hot air oven, Centrifuge, Ph. meter, Autoclave, Microscope and its parts
2	Gram Staining and Sterilization Techniques
3	Observation of micro-organism from fruit, vegetables, bread
4	Food preparations by using any two physical methods of preservation.

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-1	**MFDN -104**	**Physiology**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Describe the structure and function of human body systems **CO**2: State the mechanisms and applications physiological processes related to digestion, circulation, respiration, and excretion, significance. **CO**3: Describe the Relate physiological changes to different life stages and health conditions therapeutic applications. **CO**4: Predict, physiological knowledge to assess nutritional and health status along with the technologies.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**

1	3	3	–	–	–	2	2	–	–	–	–	–	**2.5**	2	3	2	**2.33**
2	3	3	3	–	–	–	3	3	–	–	–	–	**3**	2	3	2	**2.33**
3	3	3	–	3	–	–	3	–	3	–	–	–	**3**	2	3	3	**2.67**
4	3	3	3	–	–	3	–	2	2	3	–	3	**2.75**	3	3	3	**3.00**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Remember, Understand
CO2	Apply, Analyze
CO3	Analyze, Evaluate
CO4	Evaluate, Create

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates deep understanding of immune mechanisms; applies knowledge independently and critically.
Good (3)	Understands key immunological concepts well with minor errors in application or logic.
Average (2)	Shows basic understanding but struggles with application or connections.
Poor (1)	Minimal understanding; difficulty relating concepts to immune functions.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Digestive and Excretory System	10

Homeostasis Regulation of Body temperature Digestion & absorption of food Structure and function of Kidney Nephron and Urine formation	
Unit 2 Circulatory and Respiratory System	10
Blood, blood groups, blood pressure, blood clotting Structure of Heart and junctional tissues of heart Cardiac cycle and Types of circulation Mechanism of respiration Transport of oxygen and carbon dioxide	
Unit 3 Nervous and Endocrine System	15
Types of nervous system Types of neurons and Reflex action Transmission of nerve impulse in nerve fiber and synapse Types of endocrine glands and its functions Pituitary, thyroid, Para thyroid, and adrenal gland Hormones its action and feedback mechanism	
Unit-4 Reproductive System	10
Types of Chromosome, Kariotype Spermatogenesis and oogenesis Male and Female reproductive system Fertilization of ovum and different stages of foetus Parturition, Stages of labor, Development of breast and secretion of milk	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Standard References for Human Physiology

1. **Textbook of Medical Physiology**
   - **Author**: Guyton, A.C. & Hall, J.E.
   - **Latest Edition**: 15th Edition (2021)
   - **Publisher**: Elsevier
   - **Note**: Most widely used textbook for understanding systemic and cellular

physiology in medical and health sciences.

2. **Human Physiology: From Cells to Systems**
    - **Author**: Lauralee Sherwood
    - **Latest Edition**: 10th Edition (2021)
    - **Publisher**: Cengage Learning
    - **Note**: Good for both undergraduate and postgraduate levels with clinical insights.
3. **Principles of Anatomy and Physiology**
    - **Authors**: Gerard J. Tortora & Bryan H. Derrickson
    - **Latest Edition**: 16th Edition (2020)
    - **Publisher**: Wiley
    - **Note**: Combines anatomy with physiology and is excellent for foundational learning.
4. **Essentials of Human Physiology**
    - **Author**: R. G. Raj
    - **Latest Edition**: 12th Edition (2020)
    - **Publisher**: Orient BlackSwan
    - **Note**: Popular in Indian universities for B.Sc. and M.Sc. courses.
5. **Human Physiology**
    - **Authors**: Dee Unglaub Silverthorn
    - **Latest Edition**: 9th Edition (2022)
    - **Publisher**: Pearson

Note: Emphasizes active learning and critical thinking

Laboratory & Practical Physiology

6. Practical Physiology Book

- **Author:** C.L. Ghai – *A Textbook of Practical Physiology*
- **Why Use It:** Standard lab manual used for clinical and nutritional physiology experiments (B.P., reflexes, spirometry, etc.)

Supplementary Learning Tools

- **NPTEL Online Course:** *Human Physiology* by IITs and AIIMS faculty https://nptel.ac.in/courses
- **WHO Learning Resources on Physiology and Health** https://www.who.int

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Key Topics You Can Focus On in Nutrition Physiology:

- Digestive physiology & absorption of nutrients
- Hormonal regulation of metabolism
- Physiology during pregnancy and lactation
- Thermoregulation & energy balance
- Cardiovascular and renal physiology related to sodium/potassium balance

Web & Other Study Resources

1. Government & Educational Platforms

- **NPTEL – Human Physiology**
  https://nptel.ac.in/courses/104105124
  (Free IIT-level lectures on body systems)
- **NCERT – Class 11 & 12 Biology (Human Physiology Units)**
  https://ncert.nic.in/ebooks.html
  (Foundation chapters in simple diagrams and concepts)
- **Khan Academy – Human Anatomy & Physiology**
  https://www.khanacademy.org/science/health-and-medicine/human-anatomy-and-physiology
  (Free and visual explanations)

2. Open Textbooks

- **Human Physiology (OpenStax)**
  https://openstax.org/books/anatomy-and-physiology/pages/1-introduction
- **Anatomy and Physiology by Betts et al.** (Highly detailed and open-source)
  https://open.umn.edu/opentextbooks/textbooks/anatomy-and-physiology
- **BC Campus – Anatomy and Physiology**
  https://opentextbc.ca/anatomyandphysiology/

3.Online Video Lectures

1. YouTube Channels

- **Osmosis** – Medical-grade, animated physiology content
- **Nucleus Medical Media** – Short 3D videos (excellent for organs/systems)
- **Armando Hasudungan** – Hand-drawn diagrams on systems (neuro, cardiac, etc.)

- **Dr. Najeeb Lectures** (free/paid) – Deep conceptual lectures, medical-level

4.Virtual Lab & Interactive Resources

- **AnatomyZone** – 3D interactive models of organs/systems
  https://anatomyzone.com/
- **Visible Body (trial/free tools)** – Human physiology 3D models
  https://www.visiblebody.com/
- **Practical Physiology Manual PDFs** (Indian universities) –
  Search: *BSc physiology practical manual PDF* or request specific body system lab charts.

M.Sc. Semester-1	**MFDN -104P**	**Physiology**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: To develop practical proficiency in physiological changes to different life stages and health conditions and Anatomical studies. **CO**2: To enable students to perform quantitative and qualitative assays for detecting and analyzing physiological knowledge to assess nutritional and health status.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	–	–	2	2	–	–	–	–	–	**2.6**	3	2	2	**2.33**
2	3	2	3	–	–	–	2	3	2	3	–	3	**2.625**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Apply, Understand
CO2	Analyze, Evaluate, Create

Assessment Rubric	
Level	**Performance Descriptor**
Excellent (4)	Performs immunological tests accurately and interprets data confidently and critically.
Good (3)	Correctly performs procedures with some guidance; results generally reliable.
Average (2)	Requires M assistance; results may be partially interpreted.
Poor (1)	Needs continuous guidance; concepts and interpretation are unclear.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Demonstration of Barr body
2	Blood Grouping and Rh factor
3	Measurement of Blood Pressure (After exercise and during rest)
4	Measurement of body temperature and pulse rate (After exercise and during rest

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

Semester-2

M.Sc. Semester-2	**MFDN -201**	**Public Health Nutrition**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Describe classification, specificity, and models and role of nutrition in promoting public health and preventing disease **CO**2: State the Assess nutritional status at community and population levels. **CO**3: Describe Plan and evaluate nutrition programs and interventions for diverse groups. **CO**4: Describe techniques of policies and strategies to address malnutrition and public health challenges and their applications in Hospital and research settings.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	2	–	–	–	–	–	–	–	2	–	2	**2.25**	2	2	2	**2.00**
2	3	3	2	–	–	–	–	3	–	–	–	–	**2.75**	2	3	2	**2.33**
3	3	3	3	–	–	–	–	3	–	–	–	–	**3**	2	2	2	**2.00**
4	3	3	3	3	-	3	2	2	-	3	2	3	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Understand, Remember

CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric	
Level	**Performance Descriptor**
Excellent (4)	Demonstrates insightful understanding of Health and applies concepts independently and critically.
Good (3)	Shows strong understanding with correct application of concepts; few minor errors.
Average (2)	Basic understanding is evident but limited in application and clarity.
Poor (1)	Demonstrates minimal understanding and struggles with applying key concepts.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Community Nutrition Understanding Public Nutrition Problems and Programmes	10
Concept Scope Role of Public Nutritionists in Health Care Delivery Nutritional problems in India Anemia, Vitamin A- deficiency,	

PEM, Goiter, 1.5 Government programmes for prevention National Nutrition Mission NIPI Vit-A prophylaxes programme. Goiter control programme	
Unit 2 Assessment of Nutritional Status –1	12
Goals and Objectives Methods of Nutritional Assessment12 Indirect Assessment of Nutritional Status Direct Assessment of Nutritional Status Nutritional Anthropometry Uses of Anthropometry Common Measurements Used in Nutritional Anthropometry Methods of Assessing Nutritional Status in Individuals Determination of Nutritional Status using MUAC Determination of Nutritional Status using Weight and Height Methods of Assessment of Nutritional Status of Community Functional indicators such as grip strength, respiratory fitness, Harvard Step test, squatting test.	
Unit 3 Assessment of Nutritional Status –2	12
Clinical Assessment Training and Standardization Clinical Signs of Nutritional Disorders Biochemical Assessment Biochemical Tests-An Overview Biochemical Tests for Nutritional Deficiencies Dietary Assessment Family Diet Survey Assessment of Dietary Intakes of Individuals Qualitative Diet Surveys Institutional Diet Surveys Food Balance Sheets (FBS)	
Unit-4 Sever Acute Malnutrition (SAM) And MAM and its Management	11
Severe Acute Malnutrition (SAM) Moderate Acute Malnutrition (MAM)– prevalence and causes in India Indicators of SAM and MAM Selective feeding programme guidelines. Management strategies for addressing SAM -complicated and uncomplicated cases including home based care Monitoring of SAM and its treatment A critique of various control strategies for SAM in national programs – Child Malnutrition Treatment Centres CMTC	

Nutrition rehabilitation centres (NRC) in Gujarat)	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Title	Author(s)/Editor(s)	Edition/Year	Publisher	Remarks
Public Health Nutrition: From Principles to Practice	Mark Lawrence & Tony Worsley	2nd Edition (2020)	Allen & Unwin	Combines theory, policy, and interventions
Public Health Nutrition	Judith L. Buttriss, Ailsa Welch, John Kearney, Susan Lanham-New	1st Edition (2017)	Wiley-Blackwell (Nutrition Society Series)	Comprehensive with global case studies
Nutrition and Health in Developing Countries	Richard D. Semba & Martin W. Bloem	3rd Edition (2017)	Humana Press (Springer)	Focus on malnutrition, programs, and solutions
Nutrition for Public Health and Health Care	Linda Kelly DeBruyne	1st Edition (2022)	Cengage Learning	US-based perspective with application to systems
Textbook of Public Health and Community Medicine	AFMC Pune (Rajvir Bhalwar et al.)	2nd Edition (2019)	Wolters Kluwer India	Indian context; includes public health nutrition policies

Official Reports & Guidelines (India)

1. **ICMR-NIN Dietary Guidelines for Indians**
   - https://www.nin.res.in
   - Key reference for Indian nutrition planning and policy.
2. **National Family Health Survey (NFHS-5)**
   - https://rchiips.org/nfhs
   - Real-time data for public health nutrition research in India.
3. **POSHAN Abhiyaan Guidelines**
   - India's flagship scheme to address malnutrition
   - https://icds-wcd.nic.in
4. **National Nutrition Mission Reports (Ministry of Women & Child Development)**

Research Journals

- *Public Health Nutrition* (Cambridge University Press)
- *Maternal and Child Nutrition*
- *Indian Journal of Community Medicine*
- *The Lancet – Public Health* (for global trends)

Key Focus Areas in Public Health Nutrition

- Malnutrition (PEM, micronutrient deficiencies)
- National Nutrition Programs (ICDS, MDM, Anemia Mukt Bharat)
- Community-based assessment (growth monitoring, surveys)
- Nutrition policy and advocacy
- Maternal and child health
- Food fortification and supplementation

Web & Other Study Resources

1. . National & International Agencies

- **National Institute of Nutrition (NIN), India**
  https://www.nin.res.in
  (RDA guidelines, NNMB reports, and nutrition program data)

- **FSSAI – Eat Right India**
  https://www.fssai.gov.in/eatright/
  (National campaigns, guidelines, safe & nutritious food at community level)
- **World Health Organization (WHO) – Nutrition**
  https://www.who.int/health-topics/nutrition
  (Global data, policies, maternal-child nutrition strategies)
- **UNICEF Nutrition Programs**
  https://www.unicef.org/nutrition
  (Malnutrition, stunting, wasting, school feeding, anemia)

2. Free Open Access Textbooks

- **Nutrition, Health and Disease: A Lifespan Approach**
  https://www.springer.com/gp/book/9783319510721
- **Open Textbook: Human Nutrition (Chapter: Public Health Nutrition)**
  https://pressbooks.oer.hawaii.edu/humannutrition/
- **Introduction to Public Health in the 21st Century** (Relevant chapters on nutrition)
  https://open.umn.edu/opentextbooks/subjects/public-health

3.Online Courses & Videos

1. NPTEL / SWAYAM

- **Public Health Nutrition** by ICMR-NIN / IGNOU
  https://swayam.gov.in
  Search: *Public Health Nutrition*
- **Coursera**
  - *Global Health and Nutrition* (by Johns Hopkins, Emory, etc.)
  - *Nutrition and Lifestyle in Pregnancy* (Lifespan health)

4.. YouTube Channels

- **UNICEF India** – Micronutrient and child health videos
- **NIN India** – Government nutrition policy and research updates
- **FoodTech Pathshala** – Indian PHN topics in Hindi/English

5. Journals for Public Health Nutrition

- **Journal of Public Health Nutrition (Cambridge)**
  https://www.cambridge.org/core/journals/public-health-nutrition
- **Indian Journal of Community Medicine**
  https://www.ijcm.org.in/
- **Maternal and Child Nutrition (Wiley)**
- **Lancet Public Health (Nutrition Issues)**
- **BMJ Nutrition, Prevention & Health**

M.Sc. Semester-2	**MFDN -201P**	Public Health Nutrition	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Measure Plan and evaluate nutrition programs and interventions for diverse groups. **CO**2: Analyze the activity of policies and strategies to address malnutrition and public health challenges.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	–	–	–	–	3	–	3	–	–	**3**	3	2	2	**2.33**
2	3	2	3	–	–	–	–	3	–	–	–	–	**2.75**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric

Level	**Performance Descriptor**
Excellent (4)	Performs enzyme assays with precision, interprets results critically, and demonstrates strong analytical skills.
Good (3)	Demonstrates good practical skills with minor errors in data analysis or technique.
Average (2)	Shows basic skill in performing assays but lacks accuracy and interpretation depth.
Poor (1)	Requires guidance for basic procedures and has difficulty interpreting experimental results.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board,

2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Assess nutritional status of individuals using anthropometric methods Measure height, weight, BMI Calculate Mid Upper Arm Circumference (MUAC) Use growth charts (e.g., WHO standards) for children Interpret data to identify undernutrition or obesity
2	1.Field Data Collection & Analysis about programs like ICDS/Mid-Day Meal/ POSHAN Abhiyaan. 2. Diet Surveys and 24-Hour Recall Use food frequency questionnaire (FFQ) 3. Water and Sanitation Awareness program
3	1Planning Low-Cost Balanced Diets (Create affordable and nutritious meal plans) Plan diet for different groups: infants, pregnant women, elderly, etc. Use local, seasonal foods within budget Compare with ICMR Recommended Dietary Allowances (RDA) 2.Nutrition Education Material Development Prepare MUAC (Mid upper arm circumference) Tap Prepare posters, pamphlets, flip charts on topics like: Anaemia prevention Breastfeeding Balanced diets Role-play or demonstrate community teaching methods
4	Energy-Dense Supplementary Mix (for children). Iron-Rich Poha (for anaemia prevention) High-Protein Upma (for low-cost nutrition) Low-Cost calorie and micronutrient rich Nutri Laddu (for pregnant/lactating women) Vitamin A-Rich Carrot-Spinach Salad Low-Cost Traditional dishes Fortified and Supplementary Food Samples

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-2	**MFDN -202**	**Dietetics & Diet Counselling**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Describe the principles of dietetics and the nutrition care process. **CO**2: State various types of Plan therapeutic diets for individuals with various health conditions. **CO**3: Describe the processes of effective counselling skills for dietary behaviour change significance. **CO**4: Describe communication techniques to support clients in achieving nutritional goals.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	–	–	–	–	3	2	–	2	–	–	**2.6**	2	3	2	**2.33**
2	3	3	2	–	–	–	–	2	–	–	–	–	**2.5**	2	3	2	**2.33**
3	3	3	3	3	–	–	–	–	–	–	–	–	**3**	2	3	3	**2.67**
4	3	3	2	3	–	3	–	2	–	3	3	3	**2.77**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyse
CO4	Analyse, Evaluate

Assessment Rubric

Level	**Performance Descriptor**
Excellent (4)	Demonstrates strong theoretical grasp Dietetics and Diet Councelling.
Good (3)	Applies core counselling clarity and precision.
Average (2)	Shows basic understanding but limited in analysis or application.
Poor (1)	Minimal conceptual clarity; requires assistance to engage with Diet Concept.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Dietary Management	11
Weight Imbalance -Prevalence and Classification Guidelines for Calculating ideal Body Weight Obesity and underweight Gastrointestinal Diseases and Disorders Diarrhoea Constipation Oesophagitis Gastro Oesophageal Reflux Disease (GERD) Dyspepsia Gastritis Diverticular Disease Peptic Ulcer Malabsorption Syndrome'	
Unit 2 Dietary Management in Gout and Diabetes Mellitus	11
Gout Role of Protein and Purines Etiology Clinical Features and Complications Management of Gout Diabetes Mellitus Prevalence of Diabetes Mellitus Classification and Etiology of Diabetes Factors Affecting Normal Blood Sugar Levels	

Diagnosis Complications of Diabetes Management of Diabetes Management of Diet Food Exchange System Glycemic Index (GI) Sweeteners: Nutritive and Non-Nutritive Sweeteners Dietetic Foods Beneficial Effect of Some Foods: Supportive Therapy Exercise and Drugs	
Unit 3 Coronary Heart Diseases and their Management	11
Coronary Heart Diseases (CHD) Prevalence Etiology: Cardiovascular Risk Factors Pathophysiology of CHD Common Disorders of Coronary Heart Diseases and their Management Dyslipidemia Atherosclerosis: A Coronary Artery Disseise Hypertension (HT) Angina Pectoris Myocardial infarction (MI) Congestive Cardiac Failure Rheumatic Heart Disease (RI-ID	
Unit-4 Dietary Management in Liver and Renal Diseases	12
Liver disorders Viral hepatitis types A and B, C, E Cirrhosis of liver Hepatic coma Kidney Function: Diagnostic Tests Common Renal Diseases Etiology and Dietary Management General Principle of Dietary Management in Renal Diseases Acute and Chronic Nephritis Nephritic Syndrome Acute Renal Failure (ARF) Chronic Renal Failure (CRF) -End Stage Renal Disease, (ESRD) and Renal Calculi	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Title	Author(s)/Editor(s)	Edition/Year	Publisher	Remarks
Krause's Food & the Nutrition Care Process	L. Kathleen Mahan & Janice L. Raymond	15th Edition (2020)	Elsevier	Comprehensive clinical dietetics text with NCP and MNT
Essentials of Human Nutrition	Jim Mann & Stewart Truswell	5th Edition (2017)	Oxford University Press	Covers diet planning and counselling basics
Dietetics: A Practical Approach	B. Srilakshmi	8th Edition (2021)	New Age International Publishers	Indian context; practical dietetics and meal planning
Manual of Dietetic Practice	Joan Gandy (British Dietetic Association)	6th Edition (2019)	Wiley-Blackwell	Global reference; suitable for hospital and outpatient settings
Nutrition and Diet Therapy	Linda Kelly DeBruyne & Kathryn Pinna	12th Edition (2022)	Cengage Learning	Ideal for counseling-based diet therapy applications
Clinical Dietetics and Nutrition	F.P. Antia & Philip Abraham	4th Edition (2012)	Oxford University Press	Indian perspective with medical background
Nutrition Counseling and Education Skills for Dietetics Professionals	Betsy B. Holli & Judith A. Beto	7th Edition (2020)	Lippincott Williams & Wilkins	Focused specifically on counseling methods and communication

Diet Counselling & Communication Skills

6. Nutrition Counseling and Education Skills for Dietetics Professionals

- **Author:** Betsy B. Holli and Judith Beto
- **Focus:** Behavior change models, motivational interviewing, client-centered

counselling.

7. Nutrition Counseling Skills for the Nutrition Care Process

- **Author:** Linda Snetselaar
- **Highlights:** Application of counselling skills in clinical and community dietetics using real-life cases.

Official Guidelines & Tools

1. **Academy of Nutrition and Dietetics – Evidence-Based Guidelines**
   https://www.eatrightpro.org
   - Provides tools for NCP, counselling models, and diet planning.
2. **ICMR-NIN RDA Guidelines**
   https://www.nin.res.in
   - Used for developing diet plans in Indian context.

Key Areas of Focus in Dietetics & Counselling

- Nutrition Care Process (Assessment, Diagnosis, Intervention, Monitoring)
- Therapeutic diets (Diabetes, CVD, Renal, GI disorders)
- Individualized diet planning and menu design
- Counseling techniques (active listening, motivational interviewing)
- Patient education and behavior change communication (BCC)

Web & Other Study Resources

1. Professional Organizations

- **Academy of Nutrition and Dietetics (USA)**
  https://www.eatrightpro.org
  (Practice standards, dietetic protocols, case studies)
- **Indian Dietetic Association (IDA)**
  https://idaindia.com
  (Newsletters, Indian dietary guidelines, webinars)

- **FSSAI – Safe and Nutritious Food Initiative**
  https://www.fssai.gov.in/snf/
  (Practical tips for community diet counselling and school nutrition)

2.Free Open Access Textbooks & PDFs

- **Nutrition Care Process and Model** (AND)
  https://www.eatrightpro.org/practice/nutrition-care-process
  (Complete NCP structure for dietetic practice)
- **Open Textbook: Nutrition Counseling and Education Skills**
  https://open.umn.edu/opentextbooks/textbooks/nutrition-counseling-and-education-skills
  (Motivational interviewing, communication styles, case studies)
- **OpenStax – Nutrition: Science and Everyday Application**
  https://openstax.org/books/nutrition/pages/1-introduction

3.Online Courses & Videos

1. NPTEL / SWAYAM

- **Clinical Nutrition and Dietetics** – Includes dietetics modules
  https://swayam.gov.in
- **Nutrition Counselling Techniques** – (available on various portals)

2. YouTube Channels

- **Osmosis** – Basics of therapeutic diets and conditions
- **Nutrition Academy India** – Indian-style counselling and diet tips

Dietitian Shweta / Ishi Khosla – Indian diet counselling

M.Sc. Semester-2	**MDFN -202P**	**Dietetics & Diet Counselling**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)

After studying this course, the student will be able to
CO1: Plan therapeutic diets for individuals with various health conditions. **CO**2: communication techniques to support clients in achieving nutritional goals

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	–	–	–	–	3	–	2	–	–	**2.8**	3	2	2	**2.33**
2	3	2	3	–	–	–	–	3	–	–	–	–	**2.75**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Proficiently performs mutagenesis and mutant screening with accurate data analysis.
Good (3)	Demonstrates sound experimental skills with minor errors in observation or technique.
Average (2)	Displays partial skill and understanding; needs support in executing lab protocols.
Poor (1)	Lacks accuracy and struggles with experiment execution and interpretation.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	**Dietetics &Diet Counselling**

	Visit to a pathology lab
2	General, Reference Values and Interpretations Hemoglobin Blood glucose Serum total cholesterol Serum triglyceride Albumin test Bilirubin test Kidney function taste
3	**Dietetics & Diet Counselling** Dietary Management in Obesity and underweight Dietary Management in GI Disorders
4	Dietary Management in Gout Dietary Management Diabetes Mellitus Dietary Management in Coronary Heart Diseases Dietary Management in Liver Diseases Dietary Management in Renal Diseases

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-2	**MDFN -203**	**Nutritional Biochemistry**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to

CO1: Describe the structure, biochemical roles of nutrients in metabolism and health.
CO2: Describe the digestion, absorption, and utilization of macronutrients and micronutrients components of methods.

CO3: Describe various Analyze biochemical changes associated with nutritional deficiencies and disorders.

CO4: Use biochemical knowledge to assess nutritional status and support diet planning societal concerns.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	–	–	–	–	3	–	2	–	–	**2.8**	3	2	2	**2.33**
2	3	3	3	–	–	–	–	3	–	–	3	–	**3**	3	3	2	**2.67**
3	3	3	3	3	3	3	–	3	2	3	2	2	**2.7**	2	3	3	**2.67**
4	3	3	3	3	3	3	2	2	3	3	3	3	**8.5**	2	3	3	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates expert understanding of recombinant Nutritional and their ethical applications.
Good (3)	Applies Biochemistry techniques well; minor conceptual gaps may exist.
Average (2)	Understands basic tools but lacks clarity in their applications and integration.
Poor (1)	Struggles with core molecular cloning concepts and critical evaluation.

Teaching Pedagogy

1. Constructivism
2. Social Constructivism
3. Behaviorism

Teaching Methods and Tools

1. Direct Teaching using Black board,
2. Presentations,

3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Carbohydrates	11
Carbohydrates Definition and classification Monosaccharide- structural aspects, Disaccharide, Polysaccharide Glycolysis and krebs cycle and its energetics Errors in metabolism of carbohydrates Metabolic disorders	
Unit 2 Proteins	11
Proteins and amino acids definition and classification Functions of Protein and amino acids Metabolism of amino acid, ammonia Urea cycle Protein Synthesis Metabolic disorders and errors in protein metabolism	
Unit 3 Fats	11
Fatty Acids definition and classification Fats definition and classification Some important steroids β oxidation of fatty acids Ketosis and errors in fat metabolism	
Unit-4 Enzyme	12
Enzyme definition, nomenclature and classification of enzymes physical and chemical properties Factors affecting enzyme activity Enzyme Inhibition Physiological importance of enzyme in disease condition	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Title	Author(s)/Editor(s)	Edition/Year	Publisher	Remarks
Nutritional Biochemistry	Tom Brody	3rd Edition (1999) *(latest edition may vary)*	Academic Press (Elsevier)	In-depth explanation of nutrient metabolism and molecular nutrition
Biochemical, Physiological, and Molecular Aspects of Human Nutrition	Martha H. Stipanuk & Marie A. Caudill	4th Edition (2018)	Saunders (Elsevier)	Comprehensive for medical and graduate-level nutrition science
Introduction to Human Nutrition	Susan A. Lanham-New et al. (The Nutrition Society)	3rd Edition (2020)	Wiley-Blackwell	Includes key biochemistry concepts integrated with applied nutrition
Textbook of Biochemistry for Medical Students	D.M. Vasudevan, Sreekumari S., Kannan Vaidyanathan	8th Edition (2022)	Jaypee Brothers Medical Publishers	Popular in Indian universities for biochemistry with nutrition relevance
Essentials of Biochemistry	M.C. Pant	2nd Edition (2015)	I.K. International Publishing House	Indian context; good for foundational and applied understanding
Fundamentals of Biochemistry: Life at the Molecular Level	Donald Voet, Judith G. Voet, Charlotte W. Pratt	6th Edition (2023)	Wiley	Gold-standard for core biochemistry; advanced but relevant to nutrition

Important Topics in Nutritional Biochemistry

- **Macronutrient metabolism** – Carbohydrates, proteins, lipids
- **Micronutrient functions** – Vitamins & minerals in enzyme systems
- **Enzyme kinetics and coenzymes**
- **Energy metabolism** – ATP, TCA cycle, oxidative phosphorylation
- **Biochemical basis of nutrient deficiencies**
- **Gene-nutrient interactions (nutrigenomics)**
- **Hormonal regulation of metabolism**

Supplementary Learning Tools

1. **NPTEL Course:** *Biochemistry of Nutrition* (IIT/IISc)
   - Free lectures & notes
   - https://nptel.ac.in
2. **ICMR-NIN Guidelines on Nutrient Functions**
   - For Indian RDA-based metabolic functions
   - https://www.nin.res.in

Useful Journals

- *The Journal of Nutritional Biochemistry*
- *Nutrition Research Reviews*
- *The American Journal of Clinical Nutrition*
- *Annual Review of Nutrition*

Web & Other Study Resources

1. Educational Platforms

- **NPTEL – Nutritional Biochemistry (IIT Madras)**
  https://nptel.ac.in/courses/102106044
  (Detailed lecture series with Indian examples and MCQs)
- **NCBI Bookshelf – Biochemistry & Nutrition Texts**
  https://www.ncbi.nlm.nih.gov/books/
  (Search: "Nutrition", "Metabolism", "Biochemistry of vitamins")
- **Khan Academy – Biochemistry Modules**
  https://www.khanacademy.org/science/biology/biochemistry
  (Basic to intermediate level with animations)
- **PubChem & RCSB PDB** – Structures of nutrients, enzymes, cofactors
  https://pubchem.ncbi.nlm.nih.gov
  https://www.rcsb.org

2. Free E-Books & Open Access Textbooks

1. Top Open Source Texts

- **Biochemistry Free for All** – by Oregon State University

https://open.oregonstate.education/biochemistry

- **Principles of Biochemistry** – OpenStax (for metabolism & molecular nutrition) https://openstax.org/books/biochemistry/pages/1-introduction
- **Nutrition: Science and Everyday Application** https://openstax.org/books/nutrition/pages/1-introduction

3. Online Video Lectures

1. YouTube Channels

- **Osmosis** – Great for metabolic cycles and vitamin/mineral pathways
- **Armando Hasudungan** – Illustrated pathways (glycolysis, TCA, urea cycle)
- **Dr. Najeeb Lectures** – Advanced, detailed concepts (paid + free previews)

2. SWAYAM/NPTEL Courses

- **Basics of Biochemistry** (for Nutrition students)

Biochemistry of Macromolecules and Micronutrients

M.Sc. Semester-2	MFDN -203P	**Nutritional Biochemistry**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Explain digestion, absorption, and utilization of macronutrients and micronutrients. **CO**2: Develop proficiency in biochemical changes associated with nutritional deficiencies and disorders analysis.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	–	–	–	–	3	–	2	–	–	**2.8**	3	2	2	**2.33**
2	3	2	3	–	–	–	–	3	–	–	–	–	**2.75**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels	

CO Code	Cognitive Level
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric	

Level	Performance Descriptor
Excellent (4)	Efficiently extracts Nutritional and performs.
Good (3)	Executes experiments well with occasional guidance and moderate accuracy.
Average (2)	Performs basic steps correctly but lacks clarity in interpretation.
Poor (1)	Struggles with laboratory skills and needs assistance in nearly all procedures.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Quality analysis of Monosaccharides, Disaccharides and Polysaccharides. Quality analysis of amino acids and proteins
2	Estimation of moisture and ash content of foodstuffs Estimation of acid value of fats and oils Estimation of Vitamin - C by Titrimetric method Estimation of calcium using EDTA by titration
3	Qualitative testing of food Adulteration - Metanil yellow, Arhar dal and yellow sweets, vanaspati in pure ghee, chalk powder and sand in wheat flour, lead chromate in turmeric powder, starch in milk
4	Paper chromatography

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-2	**MFDN -204**	Entrepreneurship Management	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Describe fundamentals of fundamental concepts of entrepreneurship, business planning, and innovation in the food and nutrition sector information. **CO**2: Discuss sequence alignment methods and Analyze market trends, identify viable business opportunities, and assess the feasibility of food-based entrepreneurial ventures **CO**3: Apply practical skills in budgeting, resource management, branding, and marketing for nutrition-focused enterprises. **CO**4: Use a sustainable business model integrating ethical practices, food regulations, and community health needs while identifying future directions.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	–	–	–	–	–	2	3	–	3	–	–	**2.75**	2	2	2	**2.00**
2	3	3	3	–	–	–	–	2	–	–	–	–	**2.75**	3	2	2	**2.33**
3	3	3	3	3	2	–	–	3	–	–	–	–	**2.8**	2	2	3	**2.33**
4	3	3	3	3	3	2	2	3	-	3	3	-	**2.8**	2	3	3	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates mastery of a sustainable business model integrating ethical practices, food regulations, and community health needs and applies them effectively to real-world problems.
Good (3)	Uses computational tools accurately with minimal guidance; applies concepts well.
Average (2)	Understands concepts but struggles with technical execution and integration.
Poor (1)	Shows limited understanding and faces difficulty using basic bioinformatics tools.

Teaching Pedagogy

1. Constructivism
2. Social Constructivism
3. Behaviorism

Teaching Methods and Tools

1. Direct Teaching using Black board,
2. Presentations,
3. Multimedia resources,
4. Diagrams and Layouts,
5. Group discussion and activity,
6. Experimentation,
7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 ENTREPRENEURSHIP AND FOOD SERVICE MANAGEMENT- I	11
Introduction A Conceptual Perspective of Entrepreneurship Defining Entrepreneurship Who is an entrepreneur? Characteristics of Successful Entrepreneurs Creativity, Innovation and Entrepreneurship The Creative Process The Process of Innovation Business Requirements for Food Products What an Entrepreneur Needs to Consider Government Requirements Marketing Developing the Business Plan Determine the Resources Needed Managing the Business	
Unit 2 ENTREPRENEURSHIP AND FOOD SERVICE MANAGEMENT- II	11
Entrepreneurship Development and Training Approaches to Entrepreneurship Development The Selective Method The Shotgun Approach The Multiplier Method Intervention as an Approach Merchandising Skills Specially for Entreprenueurs Know Your Client Responding to Requests Marketing Your Business Pros and Cos of Yellow Pages Advertising Client Feedback Competition	
Unit 3 FOOD MANAGEMENT: TYPES OF FOOD SERVICE SYSTEMS	11
Introduction Introduction to Food Service Systems Types of Service Systems Conventional Commissary Ready Prepared Assembly / Serve Distribution and Service in Food Service System	

Conventional Food Service System Commissary Food Service System Ready Prepared Food Service System Assembly /Serve Food Service System Conduct and Appearance of Service Unit Personnel	
Unit-4 FOOD MANAGEMENT: QUALITY FOOD PRODUCTION - PLANNING AND CONTROL	12
Introduction Principles of Food Production Food Production Systems Management Menu Ingredient Control Production Forecasting Production Scheduling Production Control Use of Standardized Recipes Developing a Programme for Recipe Standardization Safeguard in Food Production Quality Control in Food Preparation and Cooking Controlling Microbiological Quality of Food	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Core Textbooks and References:

1. **"Entrepreneurship: Theory, Process, and Practice"**
   - **Author**: Donald F. Kuratko
   - **Edition**: 11th Edition
   - **Year**: 2023
   - **Publisher**: Cengage Learning
2. **"Entrepreneurship Development"**
   - **Author**: S.S. Khanka
   - **Year**: 2012
   - **Publisher**: S. Chand & Company Ltd.

3. **"Entrepreneurship"**
    - **Author**: Robert D. Hisrich, Michael P. Peters, and Dean A. Shepherd
    - **Edition**: 11th Edition
    - **Year**: 2020
    - **Publisher**: McGraw Hill Education
4. **"Entrepreneurship and Innovation"**
    - **Author**: Peter F. Drucker
    - **Year**: 2006
    - **Publisher**: HarperBusiness
5. **"Essentials of Entrepreneurship and Small Business Management"**
    - **Author**: Norman M. Scarborough
    - **Edition**: 9th Edition
    - **Year**: 2019
    - **Publisher**: Pearson Education
6. **"Innovation and Entrepreneurship"**
    - **Author**: Peter F. Drucker
    - **Year**: 2006 (Reprint)
    - **Publisher**: Routledge (originally Harper & Row, 1985)

Specialized References in Food and Nutrition Entrepreneurship

4. Entrepreneurship in Food Processing Sector

- **Publisher:** Ministry of Food Processing Industries (MoFPI), India
- **Includes:** Support schemes, startup ideas, value addition in food products, government policies.
- https://mofpi.nic.in

5. Entrepreneurship in Nutrition and Health Sector *(For PG Food & Nutrition Students)*

- **Custom Content Available:** Often provided in PG diploma or MSc courses with project-based approach.

6. Women Entrepreneurship in India

- **Author:** Lalitha Iyer
- **Focus:** Empowerment, challenges, and case studies in small-scale business especially in food & nutrition sectors.

Key Topics in Entrepreneurship Management

- Entrepreneurial mindset and types
- Idea generation and feasibility analysis
- Business plan preparation
- Legal and financial aspects (licensing, FSSAI, GST)
- Marketing strategies (4 Ps, digital tools)
- Institutional support (MSME, SIDBI, NABARD, MoFPI)
- Women and rural entrepreneurship

Government and Institutional Support for Startups

1. **StartUp India**
   https://www.startupindia.gov.in
   - Free courses, certification, funding opportunities
2. **MSME Tool Room – Entrepreneurship Skill Development Programme (ESDP)**
   https://msme.gov.in
3. **National Institute for Entrepreneurship and Small Business Development (NIESBUD)**
   https://niesbud.nic.in
4. **Food Processing Incubators (CFTRI, NIFTEM, IIFPT)**
   - Product testing, mentoring, business support for food entrepreneurs

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Web & Other Study Resources

1.Government & Educational Platforms

- **Startup India (GoI)**
  https://www.startupindia.gov.in/
  (Schemes, funding, incubation support, women entrepreneurs)
- **NSIC – National Small Industries Corporation**
  https://www.nsic.co.in/
  (Skill development & MSME support)
- **MSME Champions Portal**
  https://champions.gov.in
  (Financial help, tech support, market access)

- **EDII (Entrepreneurship Development Institute of India)** – Gujarat-based training
  https://www.ediindia.org
- **NABARD Agribusiness Support**
  https://www.nabard.org

2.Open Access E-Books & Learning Materials

- **Entrepreneurship: A Working Guide (OpenStax)**
  https://openstax.org/books/entrepreneurship/pages/1-introduction
- **Entrepreneurship Development** (IGNOU)
  https://egyankosh.ac.in → Search *Entrepreneurship Management*
- **Food Entrepreneurship Toolkit (FAO & UNIDO)**
  https://www.fao.org
  (Covers food processing, marketing, hygiene, and value chains)

3. Video Lectures & Online Courses

1. NPTEL / SWAYAM

- **Entrepreneurship Essentials**
  https://swayam.gov.in
  (Basics of business plans, startup models, funding)
- **Food Business Entrepreneurship**
  (Available from IGNOU/SWAYAM/FAO portals)

2. YouTube Channels

- **SIDBI India** – Financing schemes for MSMEs
- **FICCI FLO Women Entrepreneurship** – Real stories and advice

EDII Ahmedabad – Startup development programs and webinars

M.Sc. Semester-2	**MDFN -204 P**	Entrepreneurship Management	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Apply practical skills in budgeting, resource management, branding, and marketing for nutrition-focused enterprises. **CO2**: Use a sustainable business model integrating ethical practices, food regulations, and

community health needs while identifying future directions

CO–PO -PSO Mapping Matrix

CO	PO													PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	Average	1	2	3	Average
1	3	–	–	–	–	–	3	3	–	2	–	–	**2.75**	3	2	2	**2.33**
2	3	3	3	–	–	–	–	2	–	–	–	–	**2.75**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Skill
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Efficiently uses Entrepreneur and Management.
Good (3)	Demonstrates good practical understanding with occasional errors.
Average (2)	Executes basic operations but lacks deeper insight or accuracy.
Poor (1)	Needs substantial support in performing .

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Entrepreneurial and private practice School Nutrition, Sports Nutrition
2	Sustainable resilient healthy food and water system programs Business and communications
3	Community and public health

	Visit to Health care units and institutions
4	Food service systems / department

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

Semester-3

M.Sc. Semester-3	**MFDN -301**	**Food Science**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Understand the structure, composition, and functional properties of various food

components such as carbohydrates, proteins, fats, vitamins, and minerals.

CO2: Analyze the physical, chemical, and sensory changes that occur during food processing, cooking, and storage.

CO3: Apply principles of food preservation, food safety, and quality control in the preparation and evaluation of food products.

CO4: Evaluate the impact of processing techniques on the nutritional quality and shelf-life of different food items.

CO–PO-PSO Mapping Matrix

CO	PO													PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	Average	1	2	3	Average
1	3	3	–	3	–	–	–	3	–	2	2	–	**2.6**	3	3	2	**2.67**
2	3	3	2	–	–	–	–	3	–	–	2	–	**2.6**	3	3	2	**2.67**
3	3	3	3	3	–	–	–	3	–	–	2	–	**2.8**	3	3	2	**2.67**
4	3	3	3	3	–	2	–	3	–	2	2	–	**2.6**	2	3	2	**2.33**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates excellent conceptual clarity of Food Science systems and industrial applications.
Good (3)	Understands core topics well and applies them with minimal error.
Average (2)	Understands general concepts but struggles with application and depth.
Poor (1)	Shows limited understanding and difficulty applying bioprocess principles.

Teaching Pedagogy

1. Constructivism
2. Social Constructivism
3. Behaviorism

Teaching Methods and Tools

1. Direct Teaching using Black board,

2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Food carbohydrates - Basic aspects of carbohydrate in brief	11
Starch- gelatinization, retrogradation, functional properties of starches, Modified starches - Uses of modified starches in food and confectionery industries. Sugar and related product, Nutritive value, Properties, Role of Sugar in Cookery, Artificial Sweeteners Polysaccharides - cellulose, pectins, other gums, starch derivatives, fibers Non-enzymatic browning reactions- caramelization, Maillard reaction	
Unit 2 Food proteins: Basic aspects of protein	11
Classification, Composition and Biological Functions, Food Sources of Proteins Functional Properties of Proteins: Hydration, Viscosity, Gelation and Texturization, Dough Formation, Emulsifying and Surface Properties of Proteins, Foaming Properties, Binding of Flavour and other substances Protein Concentrates, Isolates and Hydrolysates and their applications	
Unit 3 Food lipid -Basic aspects of lipid	11
Classification of Lipids, Categories of Fats and Oils Physical properties-melting, crystallization, fractionation of fat, hydrogenation, inter- esterification, reversion and rancidity, Functional Properties of Food Lipids Deep fat frying Deteriorative Changes in Fats and Oils- Autoxidation, Factors Influencing Lipid Oxidation, Lipolysis, Thermal Decomposition Antioxidant Pigments in fruits and vegetables Chemistry of fruits and vegetables - pigments, changes in pigments during cooking and processing, enzymatic browning reactions. Food additives: Different types of food additives in detail.	
Unit-4 Evaluation of food Quality	12
Food Adulteration- Types of adulteration, Food standards and regulation in India, International Standards Evaluation of Food Quality- Sensory Evaluations, Types of sensory tests, Objective Evaluation	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

Reference

Textbooks in Food Science

Core References in Food Science:

1. **"Food Science"**
   - **Author**: B. Srilakshmi
   - **Edition**: 8th Edition
   - **Year**: 2021
   - **Publisher**: New Age International Publishers
2. **"Food Science"**
   - **Author**: Norman N. Potter and Joseph H. Hotchkiss
   - **Edition**: 5th Edition
   - **Year**: 1995 (latest edition available)
   - **Publisher**: Springer Science+Business Media
3. **"Principles of Food Science"**
   - **Author**: Janet D. Ward and Larry T. Ward
   - **Year**: 2016
   - **Publisher**: Goodheart-Willcox Company
4. **"Outline of Food Technology"**
   - **Author**: H.G. Kessler
   - **Year**: 2002
   - **Publisher**: Food Trade Press
5. **"Fennema's Food Chemistry"**
   - **Editor**: Srinivasan Damodaran, Kirk L. Parkin, Owen R. Fennema
   - **Edition**: 5th Edition
   - **Year**: 2017
   - **Publisher**: CRC Press, Taylor & Francis Group
6. **"Fundamentals of Food Process Engineering"**
   - **Author**: Romeo T. Toledo
   - **Edition**: 3rd Edition
   - **Year**: 2018
   - **Publisher**: Springer
7. **"Handbook of Food Science, Technology, and Engineering"**
   - **Editor**: Y.H. Hui
   - **Year**: 2006
   - **Publisher**: CRC Press

Specialized Books by Domain

5. Food Chemistry

- **Author:** H.D. Belitz, Werner Grosch, Peter Schieberle
- **Level:** Advanced
- **Good For:** Biochemical and molecular basis of food constituents.

6. Food Processing and Preservation

- **Author:** G. Subbulakshmi and Shobha A. Udipi
- **Focus:** Indian perspective; explains preservation methods, traditional and modern technologies.
- **Key Areas in Food Science**

- **Food composition and classification**
- **Cooking principles (moist/dry heat, emulsification, fermentation)**
- **Food additives and preservatives**
- **Food spoilage and quality control**
- **Food adulteration and safety (FSSAI guidelines)**
- **Food packaging and storage**
- **New product development and sensory evaluation**

Indian Regulatory and Study Resources

1. **FSSAI Manuals & Guidelines**
   - https://www.fssai.gov.in
   - Standards for food labeling, safety, hygiene, and testing.
2. **ICMR-NIN Food Composition Tables**
   - Useful for nutrient profiling and product formulation.
   - https://www.nin.res.in

Journals for Food Science Research

- *Food Chemistry*
- *Journal of Food Science and Technology*
- *LWT – Food Science and Technology*
- *International Journal of Food Science and Nutrition*

Web & Other Study Resources

1.Government and Educational Platforms

- **FSSAI (India) – Food Science and Safety**
  https://www.fssai.gov.in
  (Food standards, additives, safety regulations, fortification guidelines)
- **ICAR – Indian Institute of Food Processing Technology (IIFPT)**
  https://www.iifpt.edu.in
  (Food preservation, R&D, entrepreneur support)
- **FAO – Food Science, Safety & Quality**
  https://www.fao.org/food-safety
- **IFT (Institute of Food Technologists, USA)**
  https://www.ift.org
  (Latest trends, R&D updates, sensory and packaging science)

2.Open Access Textbooks & PDFs

1. Free E-Books

- **Introduction to Food Science** (University of Arkansas)
  https://uark.pressbooks.pub/introfoodscience/
- **Food Chemistry and Nutrition (by Springer)**
  [Open access via institutional library or researchgate]
- **Food Science and Technology (Open University)**
  https://www.open.edu/openlearn/science-maths-technology/food-science-and-nutrition
- **Food Safety Manual (FAO)**
  https://www.fao.org/3/y1579e/y1579e00.htm

3. YouTube Channels

- **FoodTech Pathshala** – Indian BSc/MSc content in Hindi/English
- **IFT Student Association** – Global research and innovations
- **SciShow** – Food chemistry, safety myths, and science behind foods

M.Sc. Semester-3	**MDFN -301P**	**Food Science**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Develop hands-on skills in identifying physical, chemical, and functional properties of various food ingredients through laboratory experiments. **CO2:** Apply standard methods to analyze the effects of cooking and preservation techniques on the sensory and nutritional quality of foods.

CO–PO -PSO Mapping Matrix

CO	PO													PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	Average	1	2	3	Average
1	3	3	3	3	–	–	–	3	–	2	2	–	**2.7**	3	2	2	**2.33**
2	3	3	3	3	2	2	–	3	2	3	3	2	**2.6**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Executes bioprocess experiments accurately and interprets results with confidence.
Good (3)	Demonstrates good laboratory skills with minor technical errors.
Average (2)	Completes tasks with guidance; limited understanding of technical applications.
Poor (1)	Struggles to follow procedures and interpret bioprocess results.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus

Practicals	
1	Study the Factors affecting coagulation of milk protein
2	Prepare recipe where crystallization, caramelisation, one –Thread and three -Thread consistency is utilized Find the smoking point of any oil
3	Do market survey of Artificial Sweeteners and milk and milk products available in the market and note nutritive value from the label.
4	Enzymatic browning in vegetable and fruit and any four method of preventing it Sensory evaluation of food product Conduct Tests To know the Sensitivity Acceptability of a new product To know likes and dislikes Food Adulteration tastes Do market survey and find the fat substances availa

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-3	**MFDN -302**	**Maternal and Child Nutrition**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Understand the nutritional requirements and physiological changes during pregnancy, lactation, infancy, and childhood. **CO2:** Assess the impact of maternal and child nutrition on health outcomes, growth, and development. **CO3:** Plan and evaluate appropriate nutrition interventions and supplementation programs for mothers and children across different stages. **CO4:** Apply knowledge of nutrition policies and programs to improve maternal and child health at the community and national levels.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	–	3	–	3	–	–	–	–	2	–	2	**2.6**	2	3	2	**2.33**
2	3	3	3	3	3	–	–	–	–	–	–	2	**2.8**	2	3	2	**2.33**
3	3	3	3	3	3	3	–	2	–	3	2	2	**2.7**	3	3	3	**3.00**
4	3	3	3	3	3	3	3	2		3	2	2	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Applies to Maternal **and Child Nutrition** .
Good (3)	Understands treatment technologies and explains Parents roles adequately.
Average (2)	Demonstrates basic understanding but limited in application or integration.
Poor (1)	Faces difficulty grasping concepts and fails to relate microbial processes to outcomes.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Physiology and psychological changes during pregnancy	11
Importance of Maternal Nutrition. Physiology and psychological changes Complication during pregnancy Problems and Treatment during Pregnancy. Embryonic and Fetal growth and Development. Stages of pregnancy. Types of delivery	
Unit 2 Nutrition During pregnancy and lactation	11
Foods needs and nutritional consideration during pregnancy and lection. Human Milk Composition. Nutritional Requirement during pregnancy. Meal planning for pregnant women. Nutritional Requirement for lactating women. Meal planning for pregnant lactating women. Nutrition During Infancy Nutrition During Infancy, Brest feeding, weaning foods, Common diseases and diet feeding the premature baby. Supplementary diet.	
Unit 3 Paediatric Problems and Nutritional Management	11
Congenital Heart Disease (CHD) Preterm /Low Birth Weight Lactose Intolerance Celiac Disease Inborn Errors of Metabolism	
Unit-4 Nutritional program	12

Nutritional program for promoting maternal and child nutrition and health. National program for prevention of blindness National Anemia control program Goiter prevention program **Integrated Child Development Services (ICDS) Scheme** Launched: 1975 Focus: Children under 6 years, pregnant and lactating women Services: Supplementary nutrition, health checkups, immunization, referral, preschool education **Mid-Day Meal Scheme (MDMS)** o Launched: 1995 o Focus: School children (Class 1 to 8) o Services: Cooked mid-day meals to improve nutritional status and school attendance **Poshan Abhiyaan (National Nutrition Mission)** o Launched: 2018 o Focus: Reducing stunting, undernutrition, anemia among children and women o Features: Convergence, technology use, and behavior change communication **Pradhan Mantri Matru Vandana Yojana (PMMVY)** o Launched: 2017 o Focus: Pregnant and lactating mothers o Services: Conditional cash transfer for improved health and nutrition **National Iron Plus Initiative (NIPI)** o Focus: Addressing anemia in all age groups o Services: Iron and folic acid supplementation **Weekly Iron and Folic Acid Supplementation (WIFS)** o Focus: Adolescents (10–19 years) o Services: Weekly IFA tablets and deworming	

Nutrition Rehabilitation Centres (NRCs) o Focus: Treatment of severely malnourished children under 5 years o Services: Medical and nutritional care **Rajiv Gandhi Scheme for Empowerment of Adolescent Girls – SABLA** o Focus: Adolescent girls (11–18 years) o Services: Nutrition, health education, life skills **Food Fortification Initiative** o Focus: Fortification of staples like rice, wheat, salt, oil, and milk o Aim: Address micronutrient deficiencies **National Nutrition Strategy (by NITI Aayog)** o Focus: India's roadmap to combat undernutrition and malnutrition holistically	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Core References in Food Science:

1. **"Food Science"**
   - **Author**: B. Srilakshmi
   - **Edition**: 8th Edition
   - **Year**: 2021
   - **Publisher**: New Age International Publishers
2. **"Food Science"**
   - **Author**: Norman N. Potter and Joseph H. Hotchkiss
   - **Edition**: 5th Edition
   - **Year**: 1995 (latest edition available)
   - **Publisher**: Springer Science+Business Media

3. **"Principles of Food Science"**
    - **Author**: Janet D. Ward and Larry T. Ward
    - **Year**: 2016
    - **Publisher**: Goodheart-Willcox Company
4. **"Outline of Food Technology"**
    - **Author**: H.G. Kessler
    - **Year**: 2002
    - **Publisher**: Food Trade Press
5. **"Fennema's Food Chemistry"**
    - **Editor**: Srinivasan Damodaran, Kirk L. Parkin, Owen R. Fennema
    - **Edition**: 5th Edition
    - **Year**: 2017
    - **Publisher**: CRC Press, Taylor & Francis Group
6. **"Fundamentals of Food Process Engineering"**
    - **Author**: Romeo T. Toledo
    - **Edition**: 3rd Edition
    - **Year**: 2018
    - **Publisher**: Springer
7. **"Handbook of Food Science, Technology, and Engineering"**
    - **Editor**: Y.H. Hui
    - **Year**: 2006
    - **Publisher**: CRC Press

Indian Context Books

4. Textbook of Human Nutrition

- **Author:** M. Swaminathan
- **Why Use It:** Trusted Indian reference for nutrition across all life stages, including extensive data on Indian diets, maternal deficiencies, and public programs.

5. A Textbook of Nutrition for Nurses

- **Author:** B. Srilakshmi
- **Use:** Suitable for UG/PG students needing practical, simple, and culturally contextual knowledge of MCH nutrition.

Public Health & Programmatic Resources (India)

6. ICDS Manual – Integrated Child Development Services

- Government guidelines on maternal and child health schemes.
- https://wcd.nic.in

7. ICMR-NIN Guidelines for Pregnancy & Childhood Nutrition

- https://www.nin.res.in
- Provides Indian RDA, anemia protocols, and guidelines for adolescent girls and pregnant women.

8. National Health Mission (NHM) & POSHAN Abhiyaan Reports

- https://nhm.gov.in
- https://icds-wcd.nic.in

Key Topics in Maternal & Child Nutrition

- Nutrient requirements during pregnancy & lactation
- Low birth weight, anemia, preeclampsia – nutritional link
- Infant and young child feeding (IYCF) practices
- Breastfeeding, complementary feeding
- Growth monitoring, malnutrition (PEM, stunting)
- Micronutrient deficiencies (iron, iodine, folate, vitamin A)
- Maternal nutrition interventions: supplementation & counselling
- National programs: ICDS, MDM, Anemia Mukt Bharat, Janani Suraksha Yojana

Web & Other Study Resources

1. National & International Platforms

- **Ministry of Health & Family Welfare (MoHFW), India**
  https://main.mohfw.gov.in
  (RMNCH+A strategy, national programs, reports)
- **National Health Mission (NHM)**
  https://nhm.gov.in
  (JSY, JSSK, immunization, maternal death audits)
- **UNICEF – Maternal and Child Nutrition**
  https://www.unicef.org/nutrition
- **WHO – Maternal, Newborn, Child & Adolescent Health (MNCAH)**
  https://www.who.int/teams/maternal-newborn-child-adolescent-health

2.Free E-Books & Open Access Textbooks

- **Maternal and Child Health Nursing – A Family-Centered Approach**
  [Free nursing resources or institutional access like Open Library, OER]
- **Nutrition in Pregnancy and Lactation – FAO/WHO Guidelines**
  https://www.fao.org/publications
- **Open Textbook: Community Health & Nutrition**
  https://open.umn.edu/opentextbooks/subjects/nutrition
- **IGNOU MCH Modules**
  https://egyankosh.ac.in → Search: *Maternal and Child Health*

3.Online Courses & Lectures

1. SWAYAM / NPTEL

- **Reproductive and Child Health** – includes maternal nutrition, growth monitoring
- **Child Health and Nutrition** (IGNOU course)

2. YouTube Channels

- **UNICEF India** – Maternal health, IYCF, malnutrition
- **NIN Hyderabad** – Nutrition in pregnancy and child health
- **MoHFW** – Janani Suraksha Yojana, Poshan Abhiyaan videos

M.Sc. Semester-3	**MFDN -302 P**	Maternal and Child Nutrition	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Assess nutritional status of pregnant women, lactating mothers, infants, and children using dietary, anthropometric, and clinical methods. **CO2:** Plan and prepare age-appropriate and condition-specific nutritious diets and nutrition education tools for mothers and children.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	–	3	–	3	–	–	–	–	2	–	2	**2.6**	3	2	2	**2.33**
2	3	3	3	3	3	3	–	3	–	2	2	2	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Conducts water quality analysis with accuracy and interprets ecological impact expertly.
Good (3)	Demonstrates sound technique and explains microbial results well.
Average (2)	Executes basic tests with limited insight or analytical depth.
Poor (1)	Requires assistance in performing and interpreting environmental protocols.

Teaching Pedagogy
1. Constructivism

2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	Maternal Nutrition Plan a diet for pregnant women. Plan a diet for a low, Middle and high–income pregnant women. Plan a diet for lactating women. Plan a diet for a low-, Middle- and high-income lactating women. Child Nutrition
2	Plan and prepare balanced diet and calculate nutrition for the following group. Preschool children
3	School children
4	Adolescent girl and boy

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-3	**MFDN -303**	**Food Production & Management**	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Understand the process of food product development from concept to market. **CO2:** Apply principles of quality control and food safety in product formulation. **CO3:** Develop packaging, labeling, and branding strategies for food products. **CO4:** Analyze market trends to manage and promote food products effectively

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	3	3	3	–	3	–	2	2	2	**2.7**	2	3	3	**2.67**
2	3	3	3	3	3	–	–	–	–	2	2	2	**2.6**	2	3	2	**2.33**
3	3	3	3	3	3	3	–	3	3	2	2	2	**2.7**	3	3	2	**2.67**
4	3	3	3	3	3	3	–	3	3	2	2	2	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates depth in Food product processes and innovation potentials.
Good (3)	Understands product development well; minimal guidance needed in applying concepts.

Average (2)	Possesses basic knowledge with limited synthesis or technical clarity.
Poor (1)	Shows weak grasp on microbial product pathways and their technological relevance.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Food Service Establishments	13
History and Development Factors Affecting Development Recent Trends Types of Food Service Establishments Commercial Establishments Non-commercial Establishments Understanding Management Approaches to Food Service Management Traditional Approach Classical Approach Scientific Approach Management by Objectives Systems Approach Quantitative Approach Behavioural and Human Relations Approach Contingency Approach Just-in-Time Total Quality Management Approach	
Unit 2 The Importance of Menu and Menu Planning in Food Service Organization	12

Definition and Functions of a Menu The Need for Menu Planning Knowledge and Skills Required for Planning Menu The Types of Menu and its Applications Types of Menus Uses of Menus Steps in Menu Planning and its Evaluation Construction of Menu How to Plan a Menu? Characteristics of a Good Menu Display a Menu Evaluation	
Unit 3 Organization and Leadership	10
Organizational Chart, Organizational Charts of Dietary/food service department, line of staff, authority, responsibility, power, delegation of authority Centralization and decentralization of food Managing an Organization Processes Involved Principles of Management Functions of Management Leadership, motivation and communication Dietician as a leader, leadership qualities that a dietitian should possess, styles of leadership and their effect on subordinates. Relation between motivation and performance, Maslow's Theory of Motivation, Fredrik Hedburg Motivation – Hygieno Theory, Application of Above theories to motivate subordinates communication, need for communication, process of communication, upward, downward and lateral communication, barriers to effective communication, listening.	
Unit-4 Personal Hygiene and Sanitary Practices in Hospital	10
Personal Hygiene and Sanitary Practices Health of Staff Sanitary Practices Sanitation Training and Education for Food Service Workers Sanitation Training and Education Who should be trained? What a Training Programme should include? Employment Practice Hazard Analysis and Critical Control Point (HACCP) Work Place Safety Why Accidents should be prevented? How Accidents Take Place? Types of Accidents Precautions to Prevent Accidents Sanitation Regulations and Standards Control of Food Quality (Adulteration and Misbranding)	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Core Reference Books for Food Production & Management:

1. **"Theory of Catering"**
   - **Author**: Victor Ceserani and David Kinton
   - **Edition**: 11th Edition
   - **Year**: 2007
   - **Publisher**: Hodder Education
2. **"Food Production Operations"**
   - **Author**: Parvinder S. Bali
   - **Edition**: 2nd Edition
   - **Year**: 2014
   - **Publisher**: Oxford University Press (India)
3. **"Quantity Food Production Operations and Indian Cuisine"**
   - **Author**: Parvinder S. Bali
   - **Year**: 2011
   - **Publisher**: Oxford University Press
4. **"Food and Beverage Service"**
   - **Author**: R. Singaravelavan
   - **Year**: 2011
   - **Publisher**: Oxford University Press
5. **"Professional Chef"**
   - **Author**: The Culinary Institute of America
   - **Edition**: 9th Edition
   - **Year**: 2011
   - **Publisher**: Wiley India Pvt. Ltd.
6. **"Introduction to Food and Beverage Service"**
   - **Author**: Lillicrap, Cousins & Smith
   - **Year**: 2014
   - **Publisher**: Hodder Education
7. **"Food Service Management"**
   - **Author**: Mohini Sethi
   - **Year**: 2011
   - **Publisher**: New Age International Publishers
8. **"Catering Management: An Integrated Approach"**
   - **Author**: Mohini Sethi and Surjeet Malhan
   - **Edition**: 3rd Edition
   - **Year**: 2015

- **Publisher**: New Age International Publishers

Indian Context Books

5. Catering Management – An Integrated Approach

- **Author:** Mohini Sethi and Surjeet Malhan
- **Best For:** Nutrition, dietetics, and food service students in Indian institutions.

Includes: Procurement, menu planning, budgeting, food safety, and service types

Key Topics in Food Production & Management

- **Types of food service systems:** Conventional, commissary, ready-prepared, and assembly-serve
- **Menu planning:** Types, factors, cycles, and therapeutic menus
- **Food purchasing and procurement:** Specifications, inventory control
- **Kitchen and workflow design:** Layouts, equipment, fuel use
- **Quantity cooking and portion control**
- **Budgeting and cost control:** Fixed/variable costs, pricing
- **Personnel management and hygiene practices**
- **Waste management and sustainability in food services**

Relevant Guidelines and Tools (India)

1. **FSSAI Food Safety Standards & Licensing**
   https://www.fssai.gov.in
   - Includes hygiene ratings, audit protocols, and kitchen best practices.
2. **NRAI – National Restaurant Association of India Guidelines**
   - For food production sustainability, hygiene audits, and customer service.
3. **ICMR – Nutrient Requirements & Menu Planning for Institutions**
   - https://www.nin.res.in

Useful Journals and Resources

- *Journal of Culinary Science & Technology*
- *International Journal of Hospitality Management*
- *FSSAI e-learning platform – FoSTaC*
  https://fostac.fssai.gov.in

Web & Other Study Resources

1. . National and Industry Portals

- **Ministry of Food Processing Industries (MoFPI), Govt. of India**
  https://mofpi.gov.in
  (Schemes, cold chain, R&D, subsidy updates)
- **FSSAI – Food Product Labeling & Innovation Guidelines**
  https://www.fssai.gov.in
- **ICAR – Indian Institute of Food Processing Technology (IIFPT)**
  https://www.iifpt.edu.in
- **Startup India – Agri & Food Sector**
  https://www.startupindia.gov.in

2.Food Product Development & Management Resources

- **Food Product Design**
  Website focused on innovation, trends, and management in food product development.
  foodproductdesign.com
- **Institute of Food Technologists (IFT)**
  Offers resources on product development, food safety, and management.
  ift.org
- **Food Business News**
  Covers new product launches, market trends, and management strategies.
  foodbusinessnews.net
- **Food Navigator**
  Provides insight on innovation, regulation, and product development.
  foodnavigator.com

3.

2. Academic and Educational References

- **ScienceDirect – Food Quality and Safety**
  Research articles and case studies on food product development and management.
  sciencedirect.com/journal/food-quality-and-safety
- **Journal of Food Science**
  Peer-reviewed articles about food technology and product innovation.

onlinelibrary.wiley.com/journal/17503841

3.Government and Regulatory Agencies

- **U.S. Food and Drug Administration (FDA) – Food Product Regulation**
  Guidelines and regulations on food product labeling and safety.
  fda.gov/food
- **European Food Safety Authority (EFSA)**
  Scientific advice on food safety and product standards.
  efsa.europa.eu

M.Sc. Semester-3	**MFDN -303P**	**Food Production & Management**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)

After studying this course the student will be able to

CO1: Demonstrate proficiency in advanced culinary techniques, including Indian and continental food preparation, portion control, and aesthetic presentation suitable for institutional and commercial settings.

CO2: Apply principles of food production management such as time scheduling, standard recipe usage, cost control, and hygiene standards in a practical kitchen environment.

CO–PO -PSO Mapping Matrix

CO	PO													PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	3	3	–	–	3	–	2	2	2	**2.6**	3	3	2	**2.67**
2	3	3	3	3	3	3	–	3	3	2	2	2	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Analyze
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Applies practical skills proficiently and demonstrates Product
Good (3)	Shows strong skills in production and analysis with minor inaccuracies.
Average (2)	Performs basic techniques with limited interpretation.
Poor (1)	Needs consistent support to perform and analyze experimental work.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1	**New Food Product development-** Sensory evaluation Sensory test- for new food product Development (for Children)
2	**A-day canteen by student-** Prepare and sell food products
3	**Preparations of recipes for Children-** Beverage (hot and cold), Soup and Sauces, Cereals Pulses, Vegetables
4	**Preparations of recipes for Children-** Salads, Desserts, Snacks, Sandwiches, Pasta, Bakery items

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

M.Sc. Semester-3	**MFDN -304**	Modern Cookery	Compulsory
Credit- 03, Total Number of Teaching Hours- 45Hrs			

Course Outcome (CO)
After studying this course the student will be able to
CO1: Demonstrate advanced culinary techniques including baking, confectionery, and cold kitchen preparations, with an emphasis on precision, presentation, and hygiene. **CO2:** Apply knowledge of international cuisines and contemporary food trends in the preparation of multi-course meals, showcasing innovation and cultural understanding. **CO3:** Plan and execute menu items using appropriate modern kitchen equipment and methods, considering cost control and resource efficiency. **CO4:** Analyze and critique food products based on taste, texture, appearance, and nutritional value, using professional sensory evaluation techniques.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	–	–	–	–	–	3	–	–	2	–	–	**2.6**	2	2	3	**2.33**
2	3	3	3	3	3	–	–	–	–	–	–	–	**3**	3	3	2	**2.67**
3	3	3	3	3	3	3	–	2	–	2	–	–	**2.7**	3	2	2	**2.33**
4	3	3	3	3	3	3	–	2	–	2	2	–	**2.6**	3	2	2	**2.33**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	**Cognitive Level**

CO1	Understand, Remember
CO2	Understand, Apply
CO3	Apply, Analyze
CO4	Analyze, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Demonstrates deep understanding of methanogens and interprets biochemical pathways critically.
Good (3)	Applies concepts accurately with some analytical ability.
Average (2)	Understands basics but lacks clarity and depth in application.
Poor (1)	Shows minimal understanding of anaerobic digestion and methanogenic systems.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Presentations, 3. Multimedia resources, 4. Diagrams and Layouts, 5. Group discussion and activity, 6. Experimentation, 7. Hands on training

Unit Wise Detailed Syllabus	
Units	**Number of Teaching Hours**
Unit -1 Application of Science in cooking	10
Cookery as a Science Objective of cooking Preliminary Preparations Cooking methods Moist heat Method and Dry heat method Microwaves cooking Solar cooking Advances in food technology	
Unit 2 Role of food ingredients in cookery	15
Foundation ingredients Fats Resigning Agents	

Salt Liquid Flavouring and Seasoning Sweetening and thickening	
Unit 3 Food ingredients and Spices used in Indian and Western Cookery	10
Importance of spices Basic information about spices Functional foods in cookery Ingredients used in bakery items Points consider while making bakery items	
Unit-4 Beverages and Appetizers	10
Classification Nutritive value Cooking tips , Serving	

Assessment Method	
Internal/Online Assessment (40%)	1. Two internal theory examination 2. Quiz/ Group Discussion 3. Assignment/ Seminar
External Assessment (60%)	1. Term End External Theory Examination

References-

Modern Cookery Reference Books:

1. **"Modern Cookery for Teaching and the Trade – Volume 1 (Theory)"**
   - **Author**: Thangam E. Philip
   - **Edition**: 6th Edition
   - **Year**: 2007
   - **Publisher**: Orient Blackswan
2. **"Modern Cookery for Teaching and the Trade – Volume 2 (Practical)"**
   - **Author**: Thangam E. Philip
   - **Edition**: 6th Edition
   - **Year**: 2007
   - **Publisher**: Orient Blackswan
3. **"Professional Cooking"**
   - **Author**: Wayne Gisslen
   - **Edition**: 9th Edition
   - **Year**: 2018
   - **Publisher**: Wiley India Pvt. Ltd.
4. **"The Professional Chef"**
   - **Author**: The Culinary Institute of America (CIA)
   - **Edition**: 9th Edition

- **Year**: 2011
- **Publisher**: Wiley

5. **"Basic Food Preparation: A Complete Manual"**
   - **Authors**: Parvinder S. Bali & Nirupa Metha
   - **Year**: 2011
   - **Publisher**: Oxford University Press
6. **"Indian Cuisine"**
   - **Author**: Pushpesh Pant
   - **Year**: 2010
   - **Publisher**: Dorling Kindersley (DK)
7. **"Quantity Food Production Operations and Indian Cuisine"**
   - **Author**: Parvinder S. Bali
   - **Year**: 2011
   - **Publisher**: Oxford University Press

Additional Resources

1. **ICMR-NIN and FSSAI Guidelines**
   - For safe food handling and cooking temperatures.
   - https://www.fssai.gov.in
2. **Culinary Institute of America (CIA) Books**
   - *The Professional Chef* – Best for high-level culinary learners.
3. **YouTube/NPTEL Culinary Modules**
   - NPTEL & IGNOU sometimes offer modules on *modern culinary science and techniques.*

Related Journals and Portals

- *Journal of Culinary Science & Technology*
- *International Journal of Gastronomy and Food Science*
- *The Art of Plating* (for trends and visuals)

Web & Other Study Resources

1. **Acton, Eliza. *Modern Cookery for Private Families*.**
   - One of the earliest and most influential cookery books, published in 1845.
   - Provides a foundation for modern cooking techniques and recipes.
   - Project Gutenberg link (free public domain text)
2. **Escoffier, Auguste. *Le Guide Culinaire (The Culinary Guide)*.**
   - Published in early 20th century, a fundamental book for modern French cuisine techniques.

- Influenced modern culinary education and professional cooking.

3. **Ferguson, Priscilla.** ***The Victorian Kitchen: Modern Cookery in the 19th Century.***

Discusse **Contemporary Online Sources on Modern Cookery**

4. **Serious Eats** — A website dedicated to modern cooking techniques and recipes. seriouseats.com
5. **Modernist Cuisine** — The official website and blog behind the famous *Modernist Cuisine* book series, focusing on scientific approaches to cooking. modernistcuisine.com
6. **BBC Good Food – Modern Cookery Section**
   - Offers a broad range of modern recipes and cooking tips. bcgoodfood.com
   - the evolution of cookery in the modern era.

Academic & Educational References

7. **Journal of Culinary Science & Technology**
   - Academic articles on new cooking methods and food science. tandfonline.com/toc/wcst20/current
8. **Food and Agriculture Organization (FAO) – Food Technology and Modern Cooking**
   - FAO publishes papers on food innovation and technology applied in cooking. fao.org/food-processing/en

Top YouTube Channels for Modern Cookery

1. **Babish Culinary Universe**
   Hosted by Andrew Rea, this channel recreates iconic dishes from movies and TV shows, offering both entertainment and culinary education.
2. **Bon Appétit**
   Features a diverse team of chefs exploring various cuisines and cooking techniques, making gourmet cooking accessible to all.
3. **Jamie Oliver**
   Known for his approachable cooking style, Jamie offers recipes that are both delicious and easy to follow, focusing on fresh ingredients and family-friendly meals.
4. **Rainbow Plant Life**
   Nisha Vora presents vibrant and flavorful plant-based recipes, catering to both vegans and non-vegans alike.
5. **Village Cooking Channel**
   A unique channel showcasing traditional Tamil village cooking methods, offering a glimpse into authentic Indian culinary practices.
6. **Made With Lau**

Features Cantonese dishes taught by Daddy Lau, preserving traditional recipes and family stories.

7. **Sorted Food**
   A British channel where a group of friends explores cooking challenges, recipe testing, and culinary adventures.
8. **Barry Lewis (My Virgin Kitchen)**
   Offers approachable recipes with a humorous twist, making cooking fun and accessible for beginners.
9. **Tasty**
   Known for quick, visually appealing recipe videos, Tasty covers a wide range of cuisines and cooking styles.

ChefSteps

Provides in-depth tutorials on advanced cooking techniques, ideal for those looking to elevate their culinary skills

M.Sc. Semester-3	**MFDN -304P**	**Morden Cookery**	Compulsory
Credit- 02, Total Number of Teaching Hours- 60Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Demonstrate proficiency in preparing and presenting a variety of modern and traditional dishes using appropriate techniques, tools, and ingredients with emphasis on hygiene and safety standards. **CO2:** Apply creativity and innovation in the preparation of contemporary recipes, including appetizers, main courses, desserts, and fusion dishes, while maintaining nutritional balance and aesthetic appeal.

CO–PO-PSO Mapping Matrix

CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	–	–	–	3	–	3	–	–	2	–	2	**2.6**	3	2	2	**2.33**
2	3	3	3	3	3	3	–	3	–	2	2	2	**2.7**	3	3	2	**2.67**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Apply, Analyse
CO2	Apply, Evaluate

Assessment Rubric

Level	Performance Descriptor
Excellent (4)	Accurately measures methane yield and interprets anaerobic digestion processes critically.
Good (3)	Performs core procedures effectively with minor inaccuracies.
Average (2)	Demonstrates limited technical skill and understanding of reactor systems.
Poor (1)	Struggles with experiment setup and analysis; requires frequent support.

Teaching Pedagogy
1. Constructivism 2. Social Constructivism 3. Behaviorism
Teaching Methods and Tools
1. Direct Teaching using Black board, 2. Experimentation, 3. Hands on training

Practical Syllabus	
Practicals	
1.	Cooking-Moist heat Method and Dry heat method
2.	Microwaves cooking, Solar cooking
3.	Functional foods in cookery
4.	Ingredients used in bakery items Prepare Beverages and Appetizers

Assessment Method	
Internal/Online Assessment (40%)	Internal Practical Examination
External Assessment (60%)	Term End External Practical Examination

Semester-4

M.Sc. Semester-4	**MFDN -401**	**Dissertation (Food and Nutrition)**	Compulsory
Credit- 20, Total Number of Teaching Hours- 600Hrs			

Course Outcome (CO)
After studying this course, the student will be able to
CO1: Develop and demonstrate the ability to independently plan, execute, and document a research project using microbiological and interdisciplinary approaches. **CO2:** Apply experimental design, data analysis, and interpretation in real-time laboratory/field settings. **CO3:** To communicate scientific findings effectively through written reports, presentations, and discussions. **CO4:** To cultivate scientific integrity, project management skills, and professional work ethics in research environments.

CO–PO-PSO Mapping Matrix																	
CO	**PO**													**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**	**1**	**2**	**3**	**Average**
1	3	3	3	3	3	3	3	3	3	2	2	2	**2.75**	3	2	3	**2.67**
2	3	3	3	3	3	3	3	3	3	2	2	2	**2.75**	3	2	2	**2.33**
3	3	3	3	3	3	3	3	3	3	2	2	2	**2.75**	2	2	3	**2.33**
4	3	3	3	3	3	3	3	3	3	2	2	2	**2.75**	2	2	3	**2.33**

(2-Medium Correlation; 3 – Strong Correlation)

Bloom's Taxonomy Levels

CO Code	Cognitive Level
CO1	Understand, Apply
CO2	Apply, Analyze
CO3	Analyze, Evaluate
CO4	Evaluate, Create

Assessment Rubric – Project (MFDN-401)	

Level	Performance Descriptor
Excellent (4)	Independently conducts research, critically evaluates data, and communicates findings with professional excellence.
Good (3)	Demonstrates competent execution and reporting of research work with minor gaps.
Average (2)	Completes project with moderate understanding and limited innovation.
Poor (1)	Requires continuous guidance and shows weak grasp of research planning and execution.

References

Books on Dissertation Writing (Food & Nutrition context):

1. **"Research Methodology: Methods and Techniques"**
   - **Author**: C.R. Kothari & Gaurav Garg
   - **Edition**: 4th Revised Edition
   - **Year**: 2019
   - **Publisher**: New Age International Publishers
   - *Widely used in Food & Nutrition dissertations for methodology section.*
2. **"Dissertation Writing for Master's and PhD Students in Food Science and Nutrition"**
   - **Author**: Dr. M. K. Jat
   - **Year**: 2021
   - **Publisher**: Agrotech Publishing Academy
   - *Specifically tailored for Food & Nutrition students in India*

Journals

- *Indian Journal of Nutrition and Dietetics*
- *The American Journal of Clinical Nutrition*
- *Journal of Nutrition Education and Behavior*
- *Maternal & Child Nutrition*

Databases

- **PubMed** – https://pubmed.ncbi.nlm.nih.gov
- **Google Scholar** – https://scholar.google.com
- **ICMR/NIN** – https://www.nin.res.in
- **FSSAI** – https://www.fssai.gov.in

5. Tools for Data Collection & Analysis

- 24-hour dietary recall, FFQ, anthropometry (BMI, MUAC, etc.)
- SPSS, MS Excel, or R for statistical analysis
- WHO Anthro Software (for children's growth analysis)